

Know Your Real Abilities

KNOW YOUR REAL ABILITIES

UNDERSTANDING AND DEVELOPING YOUR APTITUDES

by

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and

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KNOW YOUR REAL ABILITIES

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To

BARBARA *and* DEBORAH

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Why This Book Was Written

PROBABLY at no time in history have we been faced with so urgent a need for greater understanding of people, for the development of our human assets. The atomic bomb has brought this need to a breath-taking climax. Mankind's understanding of materials has so outstripped his understanding of himself that we have reached a crisis in our social and economic development. If mankind is to survive, isn't the practical way out to push an understanding of people as rapidly as we can and in as many ways as possible?

Our reason for writing this book is that we believe any information that sheds light on the problem of human relations should be made public. There are a number of groups working toward an understanding of people. Yet it is a not uncommon tendency among these research groups to withhold their findings for further substantiation, or until research is complete. But research is never complete and often present knowledge, as imperfect as it may be, can be of practical help. We believe that if groups working toward greater human understanding brought more of their findings before the people, we could arrive sooner at a better understanding of human beings.

We have confined this book solely to the research and aptitude tests of the Human Engineering Laboratory because it is the group we know the most about and with which we have had firsthand experience. Furthermore, all the groups working toward better human understanding have different approaches

to the problem, in kind or degree, and an attempt to introduce other theories and ideas in the same book, we believe, would result in confusion and conflict.

Our interest and belief in the Laboratory's work stems originally from the help we derived from it personally. Convincing of its soundness and practical value, we were spurred on to learn more about the work. So for the past six years we have collected information, have talked with others who have taken the aptitude tests, and have worked closely with the human engineers in order to pass on to others some of the practical findings from their research. But we are in no way connected with the Laboratory, nor are we scientists, psychologists, or human engineers. To the contrary, one of us is a government executive with past experience in business and industry, and was a Navy Commander in World War II. The other is a housewife and writer, with business experience in advertising and publicity. But we know from experience and observation how few persons lead full and contented lives in their work, how much talent is wasted in the world, and how seldom persons understand themselves and each other.

The approach of the human engineers to this complex problem of greater human understanding is that of science. Realizing that it was the development of physics and chemistry that opened the way to material progress, the human engineers have transferred the techniques of scientific inquiry and have applied them to human beings, in the hope this new approach will result in greater human progress. It was with this specific aim that the Human Engineering Laboratory was organized twenty-five years ago. Although the science of human engineering is just beginning, what it has accomplished so far is revelatory and heartening.

The founder and director of the Laboratory is Johnson O'Connor, a graduate in philosophy from Harvard University

and for some years assistant in astronomical mathematical research to Percival Lowell. In 1922, when Mr. O'Connor headed the engineering department at the General Electric Company in West Lynn, Massachusetts, the Human Engineering Laboratory came into existence. It remained a project of this company until 1931.

In the early twenties little or nothing had been done with aptitude tests, so the Laboratory's research began by trying to learn what jobs required what inborn abilities, and then trying to determine a means of measuring these talents. It was Mr. O'Connor's belief that if many persons in different kinds of work were measured scientifically to determine what traits were characteristic of those outstanding in their fields of work, then eventually individual traits could be isolated in persons—somewhat comparable to the discovery of the chemical elements of matter. When these *human* elements had been found through devising reliable measures for them, then these traits might be synthesized into work patterns that would help people to understand themselves and what they were best fitted for.

As tests were developed and more persons were tested the work began to take shape, and the Laboratory gradually was transposed into a nonprofit, scientific research organization. So many people outside the company wanted to take the tests that Mr. O'Connor began testing in various colleges and at his home. The year of 1928 was devoted to studying the problem of industrial relations under the Wertheim Fellowship from Harvard. After leaving its industrial home, the work was carried on for three years at Massachusetts Institute of Technology, and then it was sponsored by Stevens Institute of Technology, where test administrators could apply their work in human engineering toward their master's degrees. The Laboratory is not a vocational guidance or counseling service, but

is a research organization in which thousands of cases have been incorporated into statistics to determine what aptitudes make up the attributes for certain kinds of work.

From one man's idea, the Laboratory has grown so that it now consists of a large group of human engineers, and there are branches in Boston, Chicago, Philadelphia, St. Louis, San Francisco, Los Angeles, Tulsa, Springfield (Massachusetts), Fort Worth and New York. Basil O'Connor, no relation to Johnson O'Connor, is president of the Laboratory, also National Chairman of the American Red Cross, and president of the National Foundation for Infantile Paralysis. Anyone nine years of age or over can be tested, and the human engineers strongly recommend that the tests be given to children rather than waiting until later years when a change of direction becomes more difficult. However, so many persons belatedly seek help in understanding themselves and what they are fitted for that the majority who take the tests are adults. The Laboratory tests regularly for several hundred industrial organizations and for many schools. About three hundred thousand persons have been tested, with thirty thousand now tested yearly. Most of the tests are given individually, with pencil and paper work in all tests held to a minimum. Children are tested in single appointments, adults in double appointments.

Seventeen aptitudes, which are believed at the present time to be true ones, have been isolated and can be measured with reasonable accuracy. Many more aptitude tests are in the experimental stage, some of which may index additional aptitudes. For reference, the seventeen aptitudes are listed and defined at the end of this chapter. Also, in the back of the book are charts of some of the more common aptitude work patterns and the possible uses for them.

Because the Laboratory's research is dependent on testing all kinds of people in every type of work, anyone tested actually

is a guinea pig for human understanding. He supplies data that can be secured in no other way. But there are very few of us who would care to be tested only in the role of guinea pigs. We expect something in return. We might put it this way: if a chemical were conscious, it would gain some understanding of itself through being tested and analyzed in the chemist's laboratory. In a similar way, the individual whom the Human Engineering Laboratory measures gets an inventory of his inborn traits, which in turn means a better understanding of his abilities and what he is equipped best to do, which after all, underlies much of our adjustment and happiness in life.

While to the authors much of the interest and appeal of the Laboratory is its scientific approach to human understanding, we frankly do not feel qualified to give the more technical aspects of the work. To those interested in this phase, we refer you to *Psychometrics*, by Johnson O'Connor, published by the Harvard University Press, and to the many brochures and technical reports issued by the Laboratory. And since you cannot test yourself, we have made no attempt to describe any test or the way in which it was evolved. This information can be procured in the Laboratory's publications. We have given you only the practical aspects and the results of the work, in the belief that this will be of the most interest and use to you.

We have tried to give some of the facts and principles disclosed through research and to show how they apply in daily living. We believe that with a greater understanding of natural abilities—both our own and others—we can lead a fuller, more useful, and satisfying life, and that this presages greater good will and harmony in the world.

THE KNOWN APTITUDES

1. PERSONALITY—if objective you work best with others; if subjective you work best by yourself.
2. ACCOUNTING APTITUDE—clerical ability, adeptness at paper work.
3. IDEAPHORIA OR CREATIVE IMAGINATION—fluency of ideas.
4. STRUCTURAL VISUALIZATION—ability to think in three dimensions.
5. INDUCTIVE AND ANALYTICAL REASONING—ability to form a logical conclusion from scattered facts, and to arrange facts in logical sequence. (Traits once thought separate but now believed might be the same.)
6. FINGER DEXTERITY—nimble fingers.
7. TWEEZER DEXTERITY—ease in handling small tools.
8. OBSERVATION—ability to notice changes.
9. MEMORY FOR DESIGN—ability to memorize designs readily.
10. TONAL MEMORY—ability to remember sounds, ear for music.
11. PITCH DISCRIMINATION—measures a trait useful in playing a musical instrument for which the pitch is not set.
12. NUMBER MEMORY—ability to remember numbers of all kinds.
13. EYE DOMINANCE—indicates whether you are left- or right-sided.
14. PROPORTION APPRAISAL—ability to discern pleasing proportions.
15. GRIP—isolated as an independent element and may measure physical energy.
16. VISUAL IMAGINATION OR INTELLECTUAL VISION—is generally possessed by persons in work that calls for professional training or by persons who are successful in their own businesses. It is the ability to set a definite goal and work toward it.
17. TAPPING—measures muscular speed. May indicate quality of pushing enterprises to completion against obstacles.

Developing Human Assets

LIKE charity, the development of human assets begins at home, for every individual must work out his fullest development in his own way. Since most of us must earn a living in one way or another, this development of ourselves is confined primarily to our livelihood. It is work that unlocks our creative forces, that gives us at least some understanding of ourselves. But in this industrialized world how many of us are confused about what we really can do? Most of us take jobs because we have training for them, because of economic necessity, because others think we should, because a job sounds interesting or glamorous, or because it seems the most convenient thing to do. But once in the work, too many of us find little self-expression or feelings of self-development in it. How many men in the armed services, who left jobs to go to war, vowed they never would go back again to the same old grind, that they would come back to start over again in work of their own? How many of these have had their rosy dreams experience a rude awakening? Most of us want work in which we can put our hearts, in which we feel we are making some contribution to the world. But we see no way out in our modern world where so many jobs are routine, where individual development has been pushed aside to make way for material progress. Yet we sense vaguely that we have more in us; we feel restless and dissatisfied with ourselves; we feel inferior and inadequate. But we do not know what to do about it.

Most of us profit from advances in medicine and the physical sciences, yet when it comes to choosing one of the most important parts of our lives—our work—we cling to antiquated methods, not from choice, but because we know of no alternative. We go by trial and error; we imitate rather than dare to be ourselves. Yet what might be right for one person may be wrong for another, and there is more involved in work than ambition and the virtue of sticking to one thing.

Realizing that the solution of this problem is fundamental to human happiness, the Human Engineering Laboratory is one of the various groups that are trying to reach the essences of our instinctive, natural abilities, and the ways in which they can be utilized and developed. The human engineers believe our unused aptitudes are responsible for much of our dissatisfaction and restlessness. We cannot escape from our aptitudes; they are born with us and are constantly importuning us for their development. If we do not know our real abilities, too many of us work in the wrong direction or if we do not use enough of our aptitudes, the unused ones nag and torment us.

Most of us underestimate our abilities. The chances are that you have more aptitudes than you think you have. Or you may think you have talents you do not possess, about which you daydream uneasily and wistfully. If you take action with them they lead to little self-expression, contentment, or success. Of the seventeen aptitudes, you probably would test to have five, or six, or more. Yet the average person uses only one or two of his aptitudes in his work or play, and some use none at all, placing their reliance on acquired, rather than natural, skills. While there are undoubtedly many yet undiscovered aptitudes, knowledge based on the present seventeen has proved helpful to many persons. One of the most enlightening tests yet devised is the personality, or word association, test, which has a 92 per cent reliability. From it you learn whether you are objec-

tive or subjective, whether your natural bent is to work with others or by yourself. The scope of your vocabulary, too, which is not an aptitude but an acquired ability, and which the human engineers always measure, throws additional light on many problems.

In testing thousands of persons, including the successful and the unsuccessful, and in talking with them about their hopes and ambitions, the human engineers have uncovered facts useful to those who crave more self-expressive work. First of all, there is no such thing as a perfect job. Anyone, no matter how successful he is, how many aptitudes he is using, or how much knowledge he may possess, gets bored with his work occasionally and experiences at times waves of inferiority and uncertainty. We are human, and there are factors in life beyond the scope of any human knowledge. Probably the most we can hope for from our work is that it interests us, is useful, and is something in which we can work with confidence and pleasure because we exercise our natural abilities, giving us a feeling of accomplishment and rightness within ourselves. And for most of us, it must earn a living.

Another fact, useful to those tempted to throw everything overboard and to start over again, is that we err by making drastic changes in our work. In doing this we sacrifice valuable time, training, knowledge, and skill accumulated on the job. Furthermore, to get a new job we usually must offer some experience or knowledge—aptitudes are only a part of the story, for skill and knowledge are just as important.

One does not have to spend his life in work he does not like just because he happened to get started that way, experiencing only the desolate feeling of marking time, that leaves him disappointed with life and with himself, and the feeling of inferiority. The human engineers believe there is a practical and workable solution. It is not an easy one, for it takes courage,

hard work, and thought, but it is worth it to the person who is earnestly seeking to get more from life by giving more to it.

To give your life direction and meaning, you should first determine just what it is you want from life—setting some broad, general goal. Then examine carefully the work you are in or what you have been trained to do. If it uses only one aptitude, it offers hope. Then your job is to find a place to use another aptitude, which usually can be done with a minor change. When that aptitude is incorporated, along with necessary skill and knowledge, try to work in another, then another, until eventually you are using as many of your strongest aptitudes as you possibly can. You will see in some of the following chapters how this can be done.

Meanwhile you should keep adding to your knowledge, not only of your work but of the world in general. Lack of knowledge becomes apparent when we are older. Many aptitudes decline with age: while we can get by on high aptitudes and youthful zest, the world expects us to know something when we become mature. It is then when we can capitalize on knowledge, experience, and judgment. Furthermore, if we do lack knowledge, it is difficult to set a suitable goal for ourselves. Our high aptitudes cannot be developed because we cannot see our own possibilities.

Hand in hand with the importance of possessing knowledge is vocabulary. If there is one fact the human engineers would like to emphasize for our good, it is the advantage of an extensive vocabulary. In our maturity the world judges our knowledge by our vocabulary. Of the many thousands who have taken the Laboratory's English vocabulary test, in any field of work studied, the most successful have scored the highest in vocabulary. The human engineers have seen so many thousands of instances where really promising and gifted people have been held back by limited vocabularies. And invariably they

have found it to be true that when large companies have their periodic mergers and shakeups, it is the low-vocabulary employees of about forty and upwards who are lost in the shuffle. On the other hand, they have seen reassuring cases where an increase in vocabulary has coincided with promotion.

In the following chapters we will try to point out how all this relates to various fields of work, to show what aptitudes mean to certain kinds of work, and to interpret some of the findings of the human engineers as applied to various human problems. We have included many case histories, which are not cited as panaceas, but only to show what others have done. Sometimes, from the problem of another person, we see a clue to the answer of our own.

The Executive

THE accepted way of promotion for many years has been to become an executive. In industry particularly, the view generally held is that if ultimately we do not have others working for us, we are not successful. And how many persons begin work in industry hoping to be made executives, although in their hearts there may be no desire for it? It is only that it means recognition of ability in the eyes of others.

But everyone does not have the attributes of executives or managers; only a portion of the world's population make satisfactory and contented ones. Basically, some of us are best at directing and guiding people, while others are most fitted for individual work.

Whether or not you would make a good executive depends largely on your personality, that is, whether you like to work through others or prefer to work by yourself. The human engineers measure personality with a simple word-association test. If you test extremely objective, objective, or probably objective, you can be an administrator, but if you test in the extremely subjective quarter, you belong in individual work. Only a fourth of the world would test extremely subjective. The qualities that the human engineers believe common to good executives are an extensive vocabulary and a lack of extreme subjectivity. Accounting aptitude also is desirable in an executive because of the attention he must give to details. Most ex-

ecutives score low in creative imagination, inductive reasoning, and structural visualization.

It is important that those in executive positions be natural executives, for great responsibility rests with them, and what they are is mirrored in the persons working for them. With the top executive this reflection casts its shadow throughout the entire organization. The real executive knows how to handle persons, how to bring out the best in them, and how to inculcate a spirit of teamwork. Perhaps much of this comes from delegating authority to those capable of assuming it, in understanding and taking an interest in the abilities and the accomplishments of those beneath him. Yet underneath it all, there must be something in the executive that commands respect. Much of this stems from an ability to handle himself without antagonizing his employees and from a high vocabulary.

The fact that major executives scored higher in vocabulary than any other group came originally as a surprise to the human engineers. Just guessing at it, one would think that professional people, particularly those working with language—teachers, lawyers, writers, or editors—would score highest. However, after some reflection the answer became clear: a wide vocabulary is an indication not only of wide knowledge but of precise knowledge, and an executive rises or falls on his judgment. His is the function of making decisions, and the more general knowledge he has, the sounder will be his judgment. Not only that, but having made his decision, he must give clear and precise instructions in order to have it carried out.

Because his work is essentially the integration of the work of others toward some common end, the ideal executive in general administrative work may need to be fairly low aptitude himself to be interested in developing and using the aptitudes of others. If the executive has too many high aptitudes of his own, he works on their development rather than using the high ap-

itudes of those beneath him. It is a misconception to believe that to be the boss you must be better in everything than your employees, or at least give that impression. While the executive may make policy decisions and carry the load of responsibility, little of the actual work should be done by him. His job is to get others to do it.

The executive usually scores low in creative imagination, or ideaphoria. Of all the aptitude tests given by the Laboratory, more persons are at first disappointed if they score low in this one than in any other. For some reason they associate it with creation in arts and letters, and secretly nearly everyone likes to feel he has an aesthetic side which the term seems to connote. This is a misconception, for ideaphoria is only the *rate* of flow of ideas. The executive is better off with little or none of this trait. Highly creative people are bored by routine and details; in an executive capacity they are inclined to start too many projects, to try to put through too many schemes. It is much better for the executive to be low-creative with wide knowledge, with high-creative people working for him. He has the judgment and can select ideas worthy of being used and can carry them through.

While most executives score low in inductive reasoning, high inductive reasoning is not a handicap. But strong inductive reasoning should be accompanied by knowledge and experience, or quick conclusions reached may be only snap judgments with little real basis for them. On the other hand, the executive with low inductive reasoning, but with broad knowledge and experience, makes careful decisions because he takes time to think things through and bases his decisions on knowledge and experience rather than facile reasoning.

Executives in general do not score high in structural visualization. The lack of this aptitude means an ability to think abstractly. It is difficult to combine structural visualization with

the objectivity of the executive, although executives in structural or scientific fields often can combine this mechanical aptitude successfully with their administrative work.

It may seem reasonable to suppose that if a person is born with executive qualities, he would early gravitate to that type of work. But this is not necessarily true. One man who now occupies a highly responsible executive position floundered miserably for many years until he discovered where he belonged. He is attractive and personable, with a background of an excellent preparatory school and an engineering college. In school he found that he did not care much for engineering, and upon graduation, he went into business. Because of his appearance and family connections, he was placed in sales.

He told us that selling was perhaps the most difficult work he ever had tried to do. He did not feel at home with the other salesmen, and although he tried hard to be one of them, he couldn't seem convincing. They made him feel awkward and uncomfortable, and he felt inferior because he could not make the sales they did. When he was out with them, he often got drunk to relieve the pressure he felt, but this gave him cause for even greater self-recrimination. He decided then that he must be an individual worker and that he should take up engineering.

He secured a job as an engineer but, again, was unhappy. He felt inferior and inadequate competing with the other engineers. To him they seemed to live in another world of mechanical thoughts that he did not understand and that did not interest him. He stood this for two years and then went back into sales. He was thirty-eight at that time and was more confused and bewildered than ever. It was then that he took the aptitude tests.

He scored as the ideal executive. That is, he tested objective with average accounting aptitude, low creative imagination,

low structural visualization, and an extensive vocabulary, far above the average person and on a level with top executives. It was then that some of the aspects of his unhappy career became clear. He saw why he was such a mediocre salesman, for he needed creative imagination and extreme objectivity for that. He saw why he was a poor engineer since he had little of the mechanical aptitude of structural visualization and lacked the extreme subjectivity essential to the real engineer. But in addition, he realized that he had been working with people lower in vocabulary than himself, and that he had thought himself at fault since he could not seem to speak their language. Getting a realization of himself has resulted in a reorientation of his ideas, in setting new aims, and this has brought with it an increase in his self-reliance. Gradually he has made the transition to an executive position, which utilizes his experience and knowledge, and in which he has made outstanding progress. He feels at home in the work and feels, too, that he is now beginning to do something useful and real.

Many of us may think we are in the wrong work, but as we get older, few of us are. If originally we did not know where we belonged, we have floundered around enough to arrive approximately in the right place. If we have not advanced very far, the reason may be attributed to lack of knowledge, to low vocabulary.

A city engineer who had been doing administrative work for a number of years was tested in Boston. He was an engineering college graduate and had always thought of himself as an engineer. He was surprised and upset to learn that he did not score like one, but as an executive. He said he had been having so much trouble with his partner that he was sure he must be in the wrong work. He was in the right work for his aptitudes—executive work that utilized his engineering training. But he tested with low vocabulary.

The human engineers believe that if vocabulary is too low, our aptitudes emotionally predominate, and we need to raise our vocabulary to the level at which we can guide and control our aptitudes. The reason that the city engineer and his partner were having trouble with each other was that they were both low vocabulary. The partner was an extremely subjective engineer. Two persons can get along well if they are of opposite personalities, that is, if one is extremely objective and the other extremely subjective, if they both are high vocabulary. But low-vocabulary persons in moments of stress react emotionally and personally. The person who attempts to end heated arguments with a blow is not the objective type but is generally extremely subjective with low vocabulary. The city engineer was in the right work, but he needed wider knowledge to open up new avenues of work and to understand the relationships of people.

Any job, even the right one, gets boring at times. The human engineers have found that even successful people do not make adequate allowance for human frailty but sometimes believe that another job offers continuing interest. Executives in particular are inclined to feel this way.

Not long ago the president of a bank outside of Chicago was tested. He said he was so fed up with his work, he could stand it no longer. In fact, he decided that he had made a great mistake in his career and should have devoted his life to personnel work. As a personnel director he felt he would be leading a more useful and helpful life, and he wanted to determine from the tests whether he would make a successful one. He was in his early fifties and had family responsibilities. Since he had worked his way up from the bottom to become bank president, he thought that if he applied the same persistence and zeal, he could soon achieve similar success in personnel work.

He tested as the ideal banking executive—100 per cent ac-

counting aptitude, objective personality, above average vocabulary, low structural visualization, and no creative imagination or inductive reasoning. He lacked the creative imagination and inductive reasoning needed for effective personnel work, and while he was a successful bank president, as a personnel director he probably would be mediocre, if not a failure. A successful person may believe that he can do any job well if he works hard at it, but by reason of aptitudes the human engineers try to point out the folly of this.

Mr. O'Connor argued with the banker at length. "Why not," he urged, "go on being a bank president since you must still earn money? Your aptitudes indicate that's where you belong. But why not exercise this desire to help people as a hobby? It would seem to me you could do far more good that way, for as a bank president you have more influence in your community than you ever would have if you developed into an inferior personnel director."

The banker finally saw Mr. O'Connor's point and understood, too, some of the reasons why he had felt so restless and discontented. Any of us get tired of our work, usually because we get too close to it, or because too many details make us feel swamped. The bank president said he had not taken a vacation in seven years, that he had so much to attend to he felt he was not doing anything. Often if we can get away, we acquire a perspective which helps. In his case a vacation worked wonders. He has turned over many administrative details to subordinates and at the present time is involved in finding jobs for former servicemen.

Often it is unused aptitudes that make trouble and cause us to think we are in the wrong work. This is true with executives, for while the average person tests to have five or six high aptitudes, as a rule executive work does not employ that many aptitudes. The executive who has aptitudes outside the pattern

used in his work needs to use them. Ideally an executive should administer in the field of these aptitudes. For example, if he has musical talent, he should be an executive in music or sound; with art talent, in some branch of art or advertising; with structural visualization, in some structural or scientific field; with inductive and analytical reasoning and creative imagination, in some editorial field. However, to established executives who like their work but sense something is lacking, since they are not using their extra aptitudes, changing a field of work is rarely practical. The logical answer is a hobby. Music, art, and structure are easy enough to fit into a satisfying hobby, and inductive and analytical reasoning and creative imagination can find an outlet in writing.

An executive who inherited a large Eastern department store and became its president was tested in Boston a few years ago. He was so restless that he had decided he must be in the wrong work. The store was doing well, and he liked administrative work but was terribly restless after he left the office. His family complained about his grouchiness at home. Being devoted to his family, he could not understand what had happened to him. He felt that his work must be upsetting him.

He tested as a successful merchandising executive should—objective personality, accounting aptitude, some creative imagination, and a wide vocabulary. However, he also had high structural visualization, and most executives score low or only average in this trait. There was no place in which he could use this aptitude in administrative work, and consequently he had spent so much time in his basement workshop at home that the family complained. When the tests confirmed this strong mechanical talent that was getting no real outlet through his work, he transferred his workshop to the store. Now at intervals during the day, if he gets restless and bored with his executive work, he shuts himself up in the store workshop. This may sound like

a small boy playing with his electric train, but actually he not only has an enjoyable time, but he has helped the store thereby. So far he has installed a number of devices to make working conditions easier—mechanical change makers, conveyers, and so on. His pride and joy is an assorting device that he invented, using both his structural visualization and creative imagination, and which he installed in the store.

There is a real need for executives. A complaint, perhaps the chief one, of workers is the poor quality of supervisory personnel. If you aspire to become the successful executive, more than all else you need the ability to get along well with others and to acquire a broad knowledge, not only of your work, but of people and the world.

The Born Salesman

THE interest in salesmanship seems greater now than ever before. There is a trend to glamorize jobs involving contact with people and the great inducement is money. The lure of large commissions attracts many who may not know what else they can do, and who think anyone should be able to sell if he puts his mind to it and learns the magic of turning on the charm.

Many young men and women, and older persons too, who must make a work adjustment, are being drawn into sales, particularly those with no special training. Too many may find out later on that it is not meant for them. That something is wrong with their salesmanship at first may be evidenced by strong feelings of inferiority, when others with apparently less effort make more and better sales. Then there may follow nervous problems, perhaps excessive drinking to relieve pressure and to build up temporary confidence, but in any event a dissatisfaction in the work grows worse with the years, after youthful exuberance has worn off. Fortunately, perhaps, some now flocking to sales will be such poor salesmen that they will be forced into other more suitable work. The "born" salesmen will continue as good salesmen, but the really unfortunate person is the one caught in the middle. He is not bad enough to be let go, yet by reason of aptitudes he may never develop into more than a mediocre, unhappy salesman. He is sandwiched between the pressure from the outside world and from within himself.

Only about one person in a hundred is born with all five traits that the human engineers believe necessary for success at selling. The five traits are objective personality (preferably extremely objective), accounting aptitude, creative imagination, low structural visualization, and low inductive reasoning. These traits were found by testing thousands of persons and they appear to characterize the best salesmen. While a lack of one or more of these traits may not mean that a person cannot sell, it does mean that he is faced with the stiff competition of someone who is "born to sell," and that undoubtedly he is better fitted for other work.

Accounting aptitude is desirable for keeping records and accounts, while creative imagination is necessary for a fluency of ideas in sales approaches. Low structural visualization means the ability to think abstractly, and most salesmen use abstract thought. Why low inductive reasoning is desirable is not established, but the best salesmen score low in it. It may be that low inductive reasoning makes the salesman more persistent. If a low-inductive-reasoning person has his mind set on one thing and another person brings forth a new idea, it takes the low-inductive man longer to grasp it than the high-inductive. Thus in sales work, if a salesman has high inductive reasoning and a prospective customer comes forth with good reasons why he should not buy, the high-inductive seller is more inclined to agree and say, "I see your point perfectly," and thus to talk himself out of a sale! Who can say which is right? Many would prefer salesmen who see the buyer's point of view. On the other hand, in most sales work the salesman must compete with other persistent persons, the most successful of whom possess low inductive reasoning.

Of the five sales traits, objective personality carries the most weight. This statement is not speculation on the part of the Laboratory. It is based on the results of testing thousands of

successful salesmen, with many validations and follow-up studies. The extremely subjective person cannot make himself into a general salesman. If he must sell, he should do it in a consultant capacity in a specialized field, while the person whose objectivity is unquestionable is an all-round salesman. The extremely subjective person often is interested in mankind as a whole, while the objective person is gregarious and social minded; he is genuinely interested in the other fellow, and everybody likes him. His feelings get hurt less often than the subjective person's, and he is not so disturbed by slights, unkindnesses, rebuffs, and failures. It is easier for him to cope with human frailties and not to become so irritated or depressed by them.

A number of years ago the sales promotion manager of a large air-conditioning firm had his eighty salesmen tested in Boston. Their sales were watched carefully for six months. Then it was found that the extremely objective men sold an average of ninety-two air-conditioning units per man in that period, while the objective averaged sixty-five, the probably objective forty-five, and the extremely subjective thirty-two.

Interestingly enough, the man who sold the most was *extremely subjective*, yet his individual high sales did not raise the subjective group's sales average above thirty-two. The sales manager felt the tests were of no value since they showed that his best salesman was subjective; the human engineers tried to explain that an extremely subjective person often does sell the most in the beginning, simply because he is inclined to be more conscientious. Selling is difficult for him, and he works hard at it until he exhausts his established circle of friends and acquaintances. Two years later the human engineers were called back. The only salesmen left in the original group were the extremely objective and objective men.

One might think that if a person had the qualities of a sales-

man, he would so look and act the part that there would be no mistaking his real personality, that naturally he would be attracted to sales work. While in many instances this is true, in others it is not, and occasionally the Laboratory encounters "born salesmen" not only behaving in the most subjective manner but also holding down the most isolated kind of subjective jobs. It is quite possible to consider yourself subjective, to act subjective, yet by test to prove the opposite. Sometimes these cases reach unfortunate extremes.

One day quite by accident we witnessed an unusual case in Mr. O'Connor's study in the Boston Laboratory, when a man abruptly entered the room and in a tense voice bluntly informed Mr. O'Connor that he had just been tested and if the tests did not help him, he would kill himself. For a moment we questioned whether he were drunk or crazy but it was neither. His white face, tight lips, and burning eyes indicated his earnestness and that he had a problem within himself so acute that nothing else mattered.

Mr. O'Connor took his test scores and calmly studied them, as if this were a usual occurrence and suicide threats all a part of his day's work. We thought perhaps he would talk sympathetically with him for a little while and then send him to a good psychiatrist—which was, he said later, exactly what he intended to do until he saw the test scores.

In spite of his extreme tenseness the man was attractive, neatly and precisely dressed, about in his middle thirties. Just observing his behavior, one might have concluded that he was extremely subjective with very low vocabulary. Mr. O'Connor asked him about his work, which turned out to be research with a large Massachusetts manufacturing plant. Without a word Mr. O'Connor passed us the paper of test scores. We could hardly believe our eyes.

He scored as the ideal salesman! He also tested unusually

high in vocabulary. Speaking purely from the point of view of aptitudes Mr. O'Connor told him that his trouble arose from being in work exactly opposite to what he should be doing.

The man was amazed. As he began to talk about himself, some of his tenseness disappeared. He said going into research had seemed natural enough to him; he was studious and eager to learn and had always been a "lone wolf." In college he had avoided friends and social functions, devoting all his time to reading and study. Since graduation, he had had two nervous breakdowns; all his life he had cut himself off from a social life and from working with others, both of which are fundamental to the extremely objective person. Furthermore, his strong creative imagination, which should have been used objectively, was turned back into thinking about himself, making him a nervous wreck.

He was apologetic about his behavior and said he had been in such a mental turmoil for so long that he was truly desperate. But the astonishing thing is that what had crystallized his emotions to the point where he was threatening suicide, was an offer of a job in the sales department! He had contributed some effective ideas to the sales department and in consequence had been asked to join it. Here was opportunity pounding at his door, but he had not recognized it. Therefore he was advised to take the job at once, then to make every effort to build up a social life for himself. However, it would take some time to undo long built-up subjective habits; he could not expect to become gregarious overnight.

To us this was a revealing and fundamental experience, for it showed so clearly what a mental morass a person may create for himself when he tries to be what he basically is not. This mistake can work the other way around, too, and an extremely subjective person may get the idea that he is a born salesman. If he has poise and ease, if he is good looking and popular, he

may think he is "born to sell" and in this theory he may get encouragement from the outside world. His family and friends may tell him that his best bet is to sell, that with his looks and personality he can make a fortune.

A few years ago a young business college graduate was tested along with the other new employees of a large bank. He proved extremely subjective with 100 per cent structural visualization, and had what the human engineers consider the perfect engineering pattern, making him about one man in ten thousand. The bank president was advised not to keep him, but he did. Finally the young man did such a poor job that the bank president felt it was necessary to advise him to take his aptitude record seriously and to try to get a job in a factory, working at a bench. However he scoffed at the idea of being anything but a white collar worker and said he believed he belonged in sales, and that was where he was going. He knew he could "make a killing."

A few years went by and nothing more was heard from him. When war production began, Mr. O'Connor telephoned the bank president to ask if he could locate the young man, for a large airplane company wanted men with his aptitude pattern to train as mechanics and would pay them well. It took some time to find him, but when he was located, he was down at the heels, thoroughly disillusioned about his high-pressure sales ability, and sheepishly confessed he was in a selling job but earning only about eighteen dollars a week. He took the factory job, has made a real success of it, and is now a highly paid mechanic.

While a lack of vocabulary is a serious handicap for any of us, the salesman without vocabulary is in particular danger. When he is young, it is so easy for him to get by on his high aptitudes and his natural ability to get along well with people, that real learning is often neglected. Gaining knowledge may

not seem important when he is young and full of bounce and enthusiasm. He gets along fine the way things are, but from forty on, knowledge begins to take precedence over aptitudes and the person without it is frequently left behind. The low-vocabulary older person seems to lose the respect of others with the years. If objective, his objectivity stands out more and more as he leans heavily on it rather than on the solid foundation of knowledge. It is only among the low-vocabulary group that you find the objective person becoming the loud back-slapper, and the subjective, the awkwardly uncomfortable shrinking violet. Among high-vocabulary persons, as knowledge and social experience increase it becomes increasingly difficult to distinguish between the objective and subjective ones by their behavior.

Probably typical is an ex-government official tested recently, whose work has ended with the war. Before the war he made a great deal of money as a salesman, and it is easy to see why. He not only tests as a salesman, but is the kind of person who could sell anyone anything. He is charming, with boyish good looks and an enthusiasm that makes him good company. He is extremely popular; he has money, social position, and the rare knack of making you feel you are the most wonderful and important person he has ever known. On the surface it would appear that here is a man who has everything, that the gods have smiled on him, and that he is foreordained to have an interesting and desirable life.

When you look below the surface, however, you find a different story. He has little depth. He lacks vocabulary. Meeting him casually you would not realize it for he has a fund of entertaining talk. And he has such a charming, lovable way about him, is such a glib talker, that you can listen to him without realizing that he is saying little or nothing. But when you get down to fundamentals, you see his lack of knowledge. He

wants to reenter government service, preferably active politics or some branch of diplomacy, but he wants it only for the sake of advancing himself. He is not interested in public office as a means of solving social problems or helping people, but only to raise himself in the world.

He is approaching forty, and the next ten years will tell the story for him. If he could only be made to see that he must gain knowledge to make a real place for himself in the world. For unless he begins now to acquire knowledge, his driving ambition for prestige and his rare combination of talent and charm will be wasted. He claims some men of high position—and who consequently probably are high vocabulary—are interested in him because of his possibilities. But he is reaching the age where knowledge really begins to matter, and he does not measure up to the standard of really successful people.

Quite often the human engineers test salesmen with perfect sales-aptitude patterns, yet who are restless and dissatisfied with their jobs, even if they are successful. They say they cannot put their hearts into it. The trouble may be that they have other strong aptitudes not being used, and what they sell needs to include these and also needs to be based on their interests and aims in life. For example, a person with strong art talent cannot be content selling some product that offends his innate artistic sense or gives it no outlet. What we sell must have some meaning to us; we must feel it is important and must be sold on it ourselves. If it coincides with our aptitudes, we are more likely to feel that way about it. Since it is our unused aptitudes that cause so much of our dissatisfaction and restlessness, our chances of finding happiness and growing in our work are far greater if we can add these aptitudes to the basic selling job.

An interesting man, who tested with a perfect sales pattern of aptitudes, said he was a salesman for his family's manufac-

turing company but disliked it. When questioned as to his hobbies he replied that for some years he had collected the postage stamps of a European country and that he liked doing this better than any work he knew. He tested with outstanding tweezer dexterity which of course was exercised in handling his stamps, but beyond that he had great interest in the subject. He has converted his hobby into his work and has built up an international reputation for himself in this field. Recently he was commissioned by the government to make a national collection.

A woman who had made a lucrative position for herself in selling real estate was tested a number of years ago. She liked selling but felt something was lacking in her work. The tests showed that she had a sales-aptitude pattern, but in addition strong proportion appraisal and memory for design, giving her what the human engineers consider the ideal aptitude pattern for interior decorating. When questioned, she admitted spending a good deal of her money and spare time in making her own home attractive; furthermore, she had made many sales of residential properties by discussing the possibilities of furniture arrangements and color schemes with the prospective purchasers. Seeing the significance of her interests in conjunction with her aptitudes, she began to study interior decorating in the evenings. Soon she found she could interest a few of her real estate clients in using her services as a decorator. In this way she gradually developed a reputation and is now a full time interior decorator.

About ten years ago the human engineers tested a man in Chicago, who was selling office supplies. He was a good salesman, liked to sell, but said he could not understand why he was always so restless and dissatisfied, that he probably was the most explosive person on the sales force.

He tested as a salesman, but with strong musical talent, which

he had never developed. It was suggested that he try to get into some form of sales where he could use this talent, probably some sound field.

He turned up at the Chicago Laboratory not long ago to tell what had happened to him. He had decided to go into radio. With his very high vocabulary he felt he would like to get into radio with the aim of raising the level of entertainment, that here would be a problem that would keep him busy for the rest of his life. Making that transition was slow and at times painfully discouraging, but he has worked his way into radio and is now in charge of scripts for a large network. He plans and sells shows to sponsors, which of course uses both his musical talent and his sales ability. He says he enjoys the work thoroughly and finds in it a self-expression that he never found in selling office supplies. He feels his work has some depth and meaning and that it gives him a worthy goal.

To be happy in selling we need to be "born" salesmen. To be successful we need wide knowledge, which adds meaning and helps us see the possibilities of both our work and of developing ourselves. Knowledge gives us an understanding of people and of the world, which is all important when our work rests on influencing others.

The Office Worker

ANYONE who has ever worked in an office knows how much restlessness, discontent, and wasted time there often is among office workers. Just why this is so might be traced to a variety of reasons, but perhaps outstanding ones are that too many of us try to be clerical workers, stenographers, book-keepers, and such, when by reason of our aptitudes either we should not be doing this type of work at all, or we should be doing more; that most office jobs lack variety; that many of us consider this type of work an end in itself with no further aim.

Probably the chief reason is aptitudes. If we are in a job for which we do not have the aptitudes, or which gives us no opportunity to develop our strongest talents, naturally we feel discontented and unhappy. The world is designed around progress. We must grow in our jobs or we get left behind. If we do not progress, either we may be forced out by our own strong feelings of inferiority or we may be too easily replaced. We cannot remain static and if we feel we are not forging ahead in our work, we are certain to become dissatisfied with it.

The human engineers believe that in order to work well at the usual office jobs, first of all we need to have much accounting aptitude, which is ease in handling figures and symbols. And to be happy in jobs where we work alone much of the time—stenography, business machine operation, filing, accounting, and so on—we usually need subjective ~~personal~~ personality.

How important these two traits can be to compatible clerical work is illustrated by the experience of a capable and brilliant young woman who at the time she was tested was working in a large library. She was frightfully nervous and told the test administrator that she did not know what was going to happen to the library. According to her story the library was such a tangled, hopeless mess she thought it futile to go on until the records could be straightened out. But no one would listen to her; people did not seem to understand.

She tested with no accounting aptitude, extremely objective personality, and strong creative imagination, or ideaphoria. The simple truth was that due to her low accounting and objectivity her records were in such a snarl that she was sure the rest of the library must be in the same condition, and her imagination was running away with her. Aware of what was the matter, she has shifted from recordkeeping and is now using her creative imagination and objectivity by publicizing greater use of the library.

Because he works long hours alone with his figures and records, the typical bookkeeper needs subjective personality. But sometimes the subjective accountant may develop such a reputation for accuracy and excellency that he is rewarded with an objective, executive position where he is out of place. An interesting example of this was revealed when the management of a large plant recently spoke to Mr. O'Connor about their personnel manager, in charge of their four thousand employees. They wanted him tested to find out what was wrong with him. The president said they could not determine what ailed the man; the personnel records were in perfect order, but constant difficulty existed with his handling of employees. Most of them disliked him, which was bad for plant morale. He spent a lot of his time on clerical details, was snappy and sarcastic with the employees, and did not give them nearly the time, thought, or

consideration that he should have. Furthermore he simply could not handle labor contracts, and as things were going, he was a detriment. He had had the job for ten years, and the management wanted to be sure they were doing the right thing in releasing him.

He was thirty-five at the time he took the position—a sensitive, likable fellow in the accounting department. He had been so sympathetic and understanding that the men in his department would come to him with their problems. He liked people and had a strong urge to help them, and in his own quiet way he had developed an unofficial reputation about the plant for straightening out personnel difficulties in his department. Then the position of personnel manager opened, and word leaked out about his good work in the accounting department. He was offered the job and eagerly accepted what seemed at the time to be a great advancement. Here, he thought, was a real chance to help people.

When we talked with him, he told us he had been miserable for most of the ten years, after the first glow of enthusiasm for the new job had worn off. It had been different in the accounting department. There it had been easy to try to help people because they were all more or less his own type—professional persons with similar background and training. He understood them and could talk with them. But when it came to handling people from all walks of life and to trying to understand them and making them understand him, he found he could not do it. It only left him depressed, irritable, disillusioned, and tactless. As time went on he sought refuge in keeping and perfecting his records.

He tested as the typical accountant—extremely subjective, high accounting aptitude, low creative imagination, and low structural visualization. As personnel director he would need objectivity with at least some creative imagination. He was a

good accountant, and if only he had known his true capabilities, he could have pursued an entirely different yet highly successful course within the organization.

Roughly his progress might have gone something like this. He might have moved up to be branch accountant, from there to the general accounting department of the national organization, and thence to be comptroller, treasurer, or vice president, where he would be in a position of authority to establish policies to help the workers. He could have combined his humanitarian interests with his accounting, yet kept his accounting as his primary work. Instead he allowed his feeling for human problems and his natural desire for advancement and recognition to lead him into accepting the personnel managership where he was a failure from the very beginning. Now at forty-five he is being released from his job and is faced with the grim problem of starting over again in his accounting career.

Women score higher in accounting aptitude than men. From the Laboratory's extensive research, it has been found that 25 per cent of adult women score as high in the accounting aptitude test as the top 21 per cent of men; that 50 per cent of women score as high as the top 42 per cent of men. Also significant information for the office worker is that between the ages of thirty to forty our accounting aptitude begins to diminish. When this was first discovered, the human engineers doubted it, but when they plotted the age curve for a larger group of the population, this drop was confirmed. Therefore, people doing clerical work, particularly women, as they now do most of it, should strive to attain by their middle years positions more dependent on experience and knowledge than on the use of accounting aptitude.

Secretaries, office managers, receptionists, and others who meet and work with people need objective personalities. However, an objective girl may be required to serve an apprentice-

ship in a solitary job if she is aiming for some objective office position. But contrary to popular belief that secretarial work is an ideal entering wedge to bigger and better jobs for women, the human engineers have found that more often it hinders rather than helps. The better plan is to go directly into the kind of work one wants to do, even if it involves beginning with the lowest job in the organization.

Perhaps the real difficulty in using secretarial work as the entering wedge is that too often the title becomes stamped upon you; to the world you become known as a secretary. If you are a good secretary, you become so indispensable that few officials would be willing to let you go. Recently the Laboratory tested the secretary to a prominent museum director. She is an interesting, unmarried woman of about forty and would like to secure the director's position when he is retired. She has every aptitude necessary to do his job capably, including a vocabulary on a level with high executives; in addition, she has a backlog of fifteen years' experience with the museum, during which she often carried on the executive work alone. Yet in the eyes of the museum board, she is the director's secretary, and when the present director is retired, an executive will undoubtedly be brought in from the outside, and she would go on as secretary. She felt sure this would happen, and when she asked what to do about it, she was advised to leave her job and to try to secure a minor executive position in a similar organization; then work her way up to be a director. She has the knowledge, aptitudes, and experience that she needs to succeed at this.

A young woman tested in New York a few years ago had tried to work out a solution to conflicting aptitudes that unconsciously had been causing her excessive restlessness and boredom with her jobs. At the time she was tested, she told the human engineers that each year during the Christmas rush she worked in the subscription department of a national magazine.

She would do this for several months. Then tiring of it she would quit and take a job as a chorus girl on Broadway. That would last for a few months, after which she would not do a thing for a while. Then she would go back to the magazine job, quit after three months, return to the chorus, and so on. This had been going on for some years, and she was convinced from experience and from her own feelings that this was not the right solution. She experienced keen dissatisfaction with herself and her work. She tested with 100 per cent accounting aptitude and high ideaphoria. She was advised to utilize both aptitudes in one job, possibly beginning with clerical work in the theatrical field.

Most office jobs do not offer enough variety. This is particularly true in large organizations where a girl may be hired to perform a single routine job. Perhaps in a small organization in the role of general office worker, she seldom has time to become bored or dissatisfied. But large organizations make a mistake, for instance, in expecting a girl to put in eight hours a day at the typewriter alone. Of course, it is the rare person who does it. Too much of the day is spent in visiting, hanging around the women's lounge, manicuring nails, catching up on back correspondence, or just trying to look busy. It is killing time that brings on much of the complaining, gossiping, and criticism of others you often hear in an office. On the other hand consider the plight of a very subjective stenographer who naturally thinks about herself a great deal. If in a conscientious way she tries to type for eight hours, she not only is nervously exhausted by night, but the quality of her work suffers. If she has not been busy enough all day, she has had ample time to analyze herself, to take personally many of the slights and careless remarks often thrown about an office.

If this girl could stop typing after a few hours and could proceed to some task of a different nature, preferably one based

on the development of other aptitudes, she could return to her typing later refreshed and contented because of the variety which aids in the development of interests. Efficiency drops after a few hours at the same task. By alternating our tasks our accomplishment will be far greater, and we will not be nearly so tired at the end of a working day.

Accounting aptitude is highly useful. In office work, even if it is the only high aptitude, it can be used to build up an interesting career. What the career may be is influenced by an objective or subjective personality. For example, the person with accounting aptitude and objectivity with wide knowledge may be a good executive, while the subjective person with strong clerical ability may go far in accounting or in statistical research. With additional strong aptitudes one should be in office work in a field that corresponds to these talents in order to develop them. Furthermore, in a field of work suited to one's abilities, one is apt to find fellow workers with like tastes and interests, which adds to the merits of the job.

A twenty-three-year-old girl tested in Chicago a few years ago had been in and out of an amazing number of jobs for one so young. She was ambitious and wanted a career, but just as soon as she was on the inside of what she hoped would turn into an interesting job, she became so bored that she could not stay. It worried her excessively, and she was certain something must be wrong with her.

She had very high accounting aptitude, much ideaphoria, strong musical talent, and objective personality. Her musical talent and imagination were giving her trouble for she had no outlet for them in routine typing. Also she was too objective to be satisfied with stenography. She has taken a position now as private secretary in a television company, with the stipulation that she be given a chance to work into the advertising end. She is alternating her secretarial work with working out

new ideas to promote television and in spare time is trying to learn all she can about television and advertising. She likes her work, and adding her strong aptitudes to her job has given it variety, interest, and spice.

Another young woman with whom we talked in New York told us she was miserable in her secretarial job in a fashion establishment. She said she always felt unsure of herself, inferior, and could not seem to find anyone there who spoke her language. She had tried to conform, and because she could not, she was sure something was the matter with her. She was a shy and sensitive girl, with culture and refinement written into her entire appearance. She confessed that down in her heart she could not work up any real or lasting enthusiasm for fashion, and felt she wanted more depth and meaning to her work, but did not know what it could be.

Her reactions and feelings became quite apparent from her test scores. Vocabulary was the cause of one trouble, for she had a vocabulary on a level with top executives and was working with a group of rather low-vocabulary girls. Most persons with high vocabularies must have depth to their work, for invariably they think in more fundamental terms. Besides this, she was extremely subjective with 100 per cent art talent. This had never been formally trained, although she had spent much time in art galleries and felt at home in that atmosphere. When asked why she had never tried working in an art gallery, she was amazed. She said she never had thought of that because she knew so little about art; the gallery to her had always meant spiritual enjoyment and relaxation.

She decided then to try for a position in an art museum where she could combine her secretarial usefulness with research. She has done this and is working now in a small gallery, making herself generally useful and studying to become an authority and critic. Her surroundings satisfy her artistic sense, and she

is working with people of common tastes and interests. She has the ambition, vocabulary, and aptitudes to make a successful place for herself. But most important, she is gaining self-expression, development, and is building up a life interest that she can carry on as extensively as she chooses, whether or not she marries and raises a family.

And this brings us to an important point. Too many young women use office work only as a stopgap until they marry, with no thought of further development of their talents and interests. But foresighted women can avoid the pitfalls of future boredom, loneliness, and restlessness if they begin early to develop an interest based on their strongest aptitudes, and then keep working at it, in spare time if necessary. By the time children are grown up, these women have some work to do that really interests them, that offers true self-expression. Besides, any woman at home derives satisfaction in having an ace in the hole in the assurance that, if necessity demands it, she can turn her talents to earning a satisfactory living in an interesting way. The human engineers see this problem daily, and the authors have had many letters from older women in this position who want to know what to do.

While it is perfectly possible for a woman to build up an interesting life for herself at almost any age, the problem is much simpler if she begins early and if in addition to seeking office jobs, she tries to develop her talents. It does not need to interfere with marriage, family, and home life, but only gives a woman something to work on that makes her feel useful in her own right, a life work that is her own. Certainly this would help her develop as a person; certainly it would make her a more useful member of society.

Lack of knowledge holds back many office workers. Without knowledge we cannot develop in any job, nor can we see our own possibilities or the possibilities of our work. A hearten-

ing story is that of a clerical worker in her late twenties who was first tested some years ago. Although she had been doing clerical work, she tested right for either research or writing. But her vocabulary was low, and she was advised to build it up if she wanted to do anything with her aptitudes. She left the Laboratory, and nothing was heard from her until she turned up recently for a second test appointment. The improvement in her vocabulary was almost unbelievable.

She said she had gone from the Laboratory probably the most discouraged woman in the world. She had only an eighth-grade education, had to work because of financial necessity, and did not see how on earth she ever could secure more education. For about a year she tried to put aside all thoughts of her aptitudes until one day in desperation, she decided she never could live with herself if she did not do something about it. So she enrolled in night school and secured her complete high school education. She is now in her second year in college, taking her major in history and minor in writing, with the aim to write on historical subjects. Hers is a case where increased knowledge has opened up a completely new and different life for her. It has taken work, sacrifice, and untold courage, but she is already experiencing new interests and has far greater faith in herself.

If you are an office worker, look first to your accounting aptitude to see if you belong in an office; then look beyond to any other aptitudes, and how they can best be developed.

The Research Worker

UNDoubtedly the great contributions to civilization's development have been made by deeply subjective people. Ever since knowledge began to dawn on the awakening brain of primitive man, probing minds have dared to ask questions, to search for answers. A quarter of the world is subjective; among these a few have stood apart as the thinkers and research workers concerned with solving some riddle of the universe. All the knowledge we possess—our languages, sciences, philosophies, everything man has built for himself—has had its roots in the minds of research workers. Sometime, somewhere, someone had a problem to solve, and he isolated himself to experiment and to think.

Because there is no more frontier of land, future pioneering lies in the field of knowledge. It is thrilling to think that all discoveries of the past are only the beginning for new ones, that each new truth leads on to another. Each opens up another avenue to be explored, adding another link to the chain of knowledge. What the world will be like a hundred or a thousand years from now hinges largely on the subjective minds, and what evolves from them.

While it cannot be said that all extremely subjective people have genius, it is safe to say that the true genius who devotes his life to uncovering some basic truth, undoubtedly is subjective. It is a rare person who has genius; however, many of us range from above average to average ability, and perhaps the

reason we do not do as much as we might with what we have is that we are not aware of our strong points and our weaknesses.

Possibly our civilization has advanced no farther because of this. While we hear only of the research workers who have made spectacular discoveries, there must have been others with a desire to get at truth who were hampered by misdirection of ability. For instance, a person might have great ability for chemistry, but without the hand dexterities needed in laboratory work, one might be hampered seriously. Clumsiness, awkwardness, nervousness can claim too much attention and can slow down and distract even the greatest talent. Many researchers may have given up because of the lack or possession of some aptitude, without being aware of what was the matter or without knowing what allied work would prove more satisfactory.

As an example of this, a well-known research chemist was tested in Boston a few years ago, and at the time he was on the verge of a nervous breakdown. He could not determine the cause of his excessive nervousness. He had sought medical advice periodically, yet nothing of a pathological nature could be found to explain his condition. Furthermore, he sensed his work was not progressing as it should, and although he enjoyed chemistry and desired it as his life work, he wondered if after all he might have missed the boat—perhaps he should have been doing something else.

He had faith in the aptitude tests but became discouraged about finding the source of his trouble as the tests progressed. With each test he fitted more firmly into the pattern of research chemist. He tested extremely subjective, with high structural visualization, inductive and analytical reasoning, observation and a vocabulary, both general and scientific. But the very last test he took was for tweezers dexterity. He scored at the bottom!

He told us he felt as if a weight had rolled from his shoulders. It was as simple as that, almost like having a pebble in his shoe. He explained that his work, although it included the thinking, studying, and experimenting, which he loved, also involved picking up minute particles of substances with a small instrument and shifting their position. Of course, this would require much tweezer dexterity. No wonder he had grown so nervous; for this strain had been going on for years. When he learned the source of his trouble, it was a simple matter to adjust his work. He does less laboratory work and has an assistant with much tweezer dexterity to handle equipment. Here was a man with a brilliant mind, now making valuable contributions to chemical knowledge, who was on the verge of abandoning a useful and important career because of the lack of one aptitude.

While the first requirement for research is extremely subjective personality, other factors enter, depending on the type of research. Scientific research rests heavily on structural visualization. Many of us think of research only in terms of scientific advancement, but there are many other types of research that do not require structural visualization, that can suit the interest of any subjective person with almost any aptitude pattern. Statistical research, for instance, is based almost entirely on accounting aptitude. In industry practically any aptitude pattern can be fitted to research. In a large corporation, for example, there is always knowledge to be uncovered in any department—finance, service, public relations, personnel, materials, manufacturing, and so on.

Not all extremely subjective people are research workers, but the human engineers tell us it is important to remember that *any* subjective person is happiest when pursuing some individual work where he can uncover or create new knowledge. On the other hand there is a type of work sometimes classified as research that requires an objective personality. This is mass

interviewing, where information is secured by talking with people. But in general the objective person just does not fit into research work.

Sometimes an objective person has a strong urge for research even if he cannot do it himself. He wants to be a part of it in some way, to be in close connection with some broad and basic work that he feels is important. There is a real need for objective persons to serve as mediators between a research laboratory and the outside world. Scientists and other research workers need help from those objective persons for they become so immersed in their research problems that the procedures of running their organizations or of putting their discoveries to the best use may be poorly handled or even neglected. Such administrative functions should be in the hands of competent objective people—people, however, with wide knowledge. The objective person with a real feeling for science and with a strong desire to help mankind can perform a great service to the world in putting to good use those discoveries of real value. He can raise funds, promote, administrate, supply clerical help, attend to the details that only annoy the research worker bent with single mind on his problem.

Francis Bacon believed the hope of mankind lay in the development of science and philosophy. He devoted himself to promoting their development, trying to serve as a link between them and the world. Thus he spurred on the advancement of many of the scientific discoveries that we take for granted today. But the objective person who attempts this must have knowledge; he must be able to interpret the terms and uses of new discoveries in the light of help to humanity and to the future of the world, rather than thinking of them in terms of his selfish greed and gain.

Because the extremely subjective person naturally is sensitive and introspective, misplacement is hard on him. Although

a maladjusted objective person may suffer keenly, the subjective person in the wrong work probably is the most unhappy of all people.

A man was tested a few years ago in Philadelphia who had crowded more misery into his working life by the age of twenty-eight than most of us ever experience in a lifetime. For one thing, he stammered so badly he could scarcely make himself understood. His family were wealthy and had tried everything they could to help him. He could not get work on his own, and finally the family put him in an uncle's department store, where he worked for several years as a floorwalker and salesclerk. People asked him questions all day long, some poked fun at him, and his stammering, nervousness, and overwhelming sense of inferiority grew worse. In desperation he gave it up and took a job as mechanic in another relative's factory. Here he did not have to talk to people, but he was a poor mechanic, and his sense of complete failure and inferiority were intensified. By the time he took the aptitude tests, he was certain he had failed in life—at not yet thirty!

He tested with extremely subjective personality, much creative imagination, low structural visualization, high inductive reasoning and accounting aptitude, and an average vocabulary. He also tested left-eyed and right-handed. This proved of great significance to him, for the human engineers have found that 43 per cent of boys who are left-eyed and right-handed have speech defects of many kinds and other nervous problems. This man was amazed to learn that if he changed gradually to the use of his left hand, he probably could eventually cure his stammering. And he just could not believe nothing was really wrong with him, only that his jobs as floorwalker, salesclerk, and mechanic probably were the last things in the world he should have been doing with his aptitudes, that his unhappiness and sense of failure stemmed from this.

He was delighted to learn that he belonged in some type of literary research and said history always had fascinated him, and most of his reading centered about it. He has now tackled a special problem in historical research, planning to write about it eventually. His stammering cure has been long and slow; he began the transition with such simple measures as carrying his handkerchief in his left pocket and lighting cigarettes with his left hand. He still stammers under pressure but is much better. Best of all is that his entire outlook has changed, and he is optimistic for the first time in his life. He gets great satisfaction out of the quiet delving into the past that his research affords. He still must fight off occasional waves of inferiority but is slowly building up faith in himself and his abilities.

The extremely subjective person often lacks faith in himself; he needs encouragement and building up. Most of all he needs knowledge to give him self-reliance and to make his work effective. It may be years before his research bears any fruit, and because he is alone in the world with his special problem, he may have to challenge a world that does not understand him. Some people may think he is unsound, for many ideas worked on by research persons seem preposterous and impossible to anyone else. He needs wide knowledge for self-confidence. Knowledge both in his specialized field, and of the world in general is needed if he is to attempt to solve a problem that will be of use. To have the courage to keep going, often in spite of ridicule, requires in addition to great knowledge, a goal and an abiding faith that he is doing the right thing. When the Human Engineering Laboratory itself first began, there were many who scoffed at it. Johnson O'Connor says he went through a period where it seemed that almost everyone thought he was impractical. But now that his theories are proving themselves of use, his work is widely recognized, and human engineering is taking its place among the sciences.

Research is slow, groping, and costly. The Laboratory, a research institution, has developed many tests which have failed completely to measure what they were originated for. Some have been worked on for years, then have proved useless so far as is now known, or have turned out to measure something entirely unexpected. The word association test, for example, that tells us now with 92 per cent reliability whether we are objective or subjective, was created in an effort to measure the inventiveness of the employees of an industrial plant. It was thought that an inventor must have unusual ideas, so a test was made up and scored on the basis of the number of unusual ideas. One hundred men were tested, and the results tabulated. The test not only did not check accurately mathematically, but did not elicit unusual ideas. After checking it again, the test was scrapped, and a new one developed to test usualness of ideas. This time accuracy was obtained mathematically, but it still failed to bring forth unusual ideas. With continued testing and checking there was gradually evolved the fact that surgeons, doctors, engineers, writers, inventors, and the like score at one end, while salesmen and executives score at the other—the foundation of the personality test as we now know it.

The extremely subjective person worries about not doing all right, which is another reason why he needs to understand his capabilities and to work toward their fulfillment. About fifteen years ago an attractive young physical education teacher took the aptitude tests at the Boston Laboratory. Mr. O'Connor happened to test her himself, and just as soon as she met him, she announced that she had no memory. Because of no memory, she had had difficulty in school and thus had been compelled to give up her life's ambition to go into medical research. She felt sure that she would fail at this career because of her memory.

She tested extremely subjective with high structural visuali-

zation, low accounting aptitude, strong hand dexterities, observation and inductive reasoning, and very high number memory. In general, she had all she would need for medical research. Mr. O'Connor tried to make her see that her memory was all right, that her school troubles came from low accounting aptitude and high structural visualization. Low accounting aptitude would give her difficulty with examinations, reading, and all paper work, while strong structural visualization would make the assembling of apparatus in laboratory work far more desirable than study. Also, it is characteristic of persons with low accounting aptitude in reading, for instance, to start a sentence and then to lose track of the words just read. This is what gave this young woman the impression that she had no memory.

With this knowledge and with the faith in herself gained by realizing that her memory was all right, she went back to school to get a college background. She is now a full professor in physiology with a grant for half-time research, working for her doctor's degree. She is planning to secure both doctor of physiology and doctor of medicine degrees. She has a hard time with every examination but gets through because she allows for her low accounting aptitude. And of course because she is subjective she frets about not doing her work well enough. Actually, Mr. O'Connor tells us that she is doing an outstanding job and is making a name for herself in medical research.

Although women in general do not have so much structural visualization as men, 25 per cent of women do score high in it. Every once in a while some woman makes a great scientific discovery that confirms that women have talent in this direction—Madame Curie, for instance, and more recently Dr. Meitner. Probably there are many other women with potentialities for research that are not aware of their own possibilities. A subjective housewife may have an ideal chance to work on some re-

search problem in spare hours at home. Many women whom the Laboratory has tested are doing research of various kinds, some to help their husbands and others to help themselves to a more useful and interesting life.

Some of these cases are sagas of courage, hard work, steadfast determination, and purpose. One of these is that of a middle-aged housewife from a small New Jersey town who took the aptitude tests in New York about five years ago. She was eager to find out her possibilities. At home she had an example of the plight of older women with no interests of their own. Her mother lived with the family and her intervention in all family affairs, as well as her sensitivity, unhappiness, and feeling of marking time in her old age were a grim warning to the woman. Unless she did something about it, she could see herself growing just like her mother. Above all she did not want that kind of life. She had always dreamed she might do something some day, but she had been so busy raising a family that these thoughts had been pushed aside. But now the children were at school, her husband was a doctor with irregular hours, and she found she had extra time. What could she do?

It came as a great surprise to her to learn she had the aptitudes of a research scientist, that biology might be suitable for her. But how could she become a biologist, of *all* things, she wanted to know, in a town of a thousand people with no adult educational facilities, and with only a high school education herself. The human engineers could not give her the answer. They told her they could only measure her aptitudes, that for the rest she would have to work out her own methods. But if she really wanted to, they told her, she would find the solution.

It was extremely difficult for her, for in a small town everyone naturally knows everyone else's business, and many looked askance at a prominent doctor's wife, who at almost fifty suddenly had decided to become a biologist. At first she did not

know where to turn; the whole idea seemed absurd. But with her husband's encouragement she bought all the secondhand biology books she could find, and he bought her a secondhand microscope. Once she began to study, she found biology of absorbing interest. Yet she soon found that study was not enough and that she must have laboratory work. Where to get the latter was a real problem. Finally, in spite of sarcastic criticism from her mother, she summoned her courage and asked the high school physics teacher if she could come to school and do laboratory research under his supervision. When she explained her problem to him, she was agreeably surprised with his cooperation.

She has been doing this for four years now. She feels her life is just beginning and has found, too, that a mutual interest in science has resulted in a closer intellectual relationship with her husband. It has taken great courage and perseverance on her part to train herself in biology. And perhaps some new knowledge may come out of her efforts—a new cure for a disease, some biological discovery to help future generations—who knows? Meanwhile, she is a happier and more mentally developed person. No real effort ever is wasted in the world.

To enjoy research we need to be subjective, working in a specialized field that corresponds to our strongest aptitudes and interests. If the subjective person has this, plus wide knowledge, he stands an excellent chance of making some lasting contribution to the world.

The Born Engineer

WARTIME technical developments have created widespread public interest in the work of engineers, and at long last there is opportunity for them to come into their own. But whether or not they will depends in great measure upon the engineers themselves. While it is true that industry in general has long given precedence to executives and salesmen over engineers, we wonder if perhaps it might not be the engineers themselves who are largely at fault. To be sure, management may be censured to a degree for not recognizing the vast significance of engineering work and for not giving it its proper due, but isn't it true that on the whole engineers are apt to be so engrossed in their particular problems that they neglect the all-important value of human relationships? They have not learned how to get along with people. This, of course, is more difficult for the engineer because of his subjective nature, than for the objective executives and salesmen. Yet if the engineer would broaden his horizon of experience and knowledge beyond the narrow confines of his engineering work, he could not only find more in common with others and thus get along better with them, but he would also be able to accomplish more with the engineering knowledge he possesses.

This limitation harks back to vocabulary. It may surprise some persons that engineers in general score low in English vocabulary, although they usually score high in technical vocabulary tests. And as we have mentioned before, among high-

vocabulary people it is almost impossible to detect objectivity or subjectivity by social behavior, but among low-vocabulary persons either trait usually stands out. Until the engineers gain a broader knowledge of the world and of people, in addition to their specialties, they will remain consigned to back seats in industry, in spite of the challenge offered them now. It certainly requires broad knowledge on the part of both objective and subjective people to understand each other and what each is trying to achieve, to learn to give true value to the work of each.

The primary aptitude for an engineer is structural visualization—our ability to think in three dimensions. Although in a sense you might call it a man's aptitude, yet 25 per cent of women have strong structural visualization. It is believed that women inherit it from their fathers, men from their mothers.

For the engineer these are days of specialization. No longer can a man or woman go into general engineering and expect to achieve much success. The type of engineering we do should be compatible with our strongest aptitudes if we are to give it our best and to get the most satisfaction from our work. For example, sound engineering utilizes musical talent, designing engineering needs art talent, cost engineering uses accounting aptitude, and so on.

Because most engineering is individual work involving specialized knowledge, an engineer should be extremely subjective. This aptitude pattern of extreme subjectivity with strong structural visualization runs counter to the successful executive's pattern of objectivity with low structural visualization. Yet the management of many industries selects men for straight executive work from among their best engineers. The human engineers often tell industry it might be better to select their poorest engineers for executive jobs, for then the chances

could well be that these men are wrong for engineering and right for executive work. But in taking the cream of the technical crop for executive posts, in most instances the company loses its best engineers and gains only inferior and unhappy executives.

Just recently a large mill of nine thousand employees asked the Laboratory to test twenty minor executives to indicate which could be developed into major executives. This request came as the result of an unfortunate experience that the firm had about twenty-five years ago when they had taken their best engineer out of engineering and had placed him in a highly responsible executive position. He was a failure from the start, but since they had put him in the job, the management let him stay for six years. Then they were forced to take him out of it, and they placed him back in his old engineering job. It ruined his life; he felt keenly that he was a failure, that he had nothing to look forward to in the company. When he was tested, he scored as subjective as it is possible to score, with strong structural visualization. If he had been allowed to remain in engineering and had been given promotion there, he could have been encouraged to go on into more advanced phases of it, which would result in greater benefit to the organization and certainly would have made for a happier development of the man himself. The executives who were with the firm when the man was promoted told Johnson O'Connor that they felt at the time that they had done the right thing; now all see clearly the fallacy of such promotions.

A sound engineer was tested some time ago in Philadelphia. For fifteen years he has been employed by one of the largest companies in the sound field. He went into the job when he was graduated from engineering school and for a number of years was considered one of their most capable engineers. He

tested extremely subjective with strong structural visualization, musical talent, and tweezers dexterity—an ideal pattern for a sound engineer. He was low-vocabulary.

About two years ago the management decided his engineering work with the company should be rewarded, so they took him out of engineering and promoted him to an excellent straight executive position, which he was thrilled to accept because it meant recognition, added prestige, and more money.

He failed miserably at it, and in a brief time was put back in his former engineering job. What it has done to him personally is tragic, for this type of thing is especially hard on a sensitive, introspective person. He is convinced that he has failed completely in life and, consequently, has lost interest in everything. He has become excessively thin and nervous, he suffers from lapses of memory, and friends who know him intimately tell us they have been shocked at his change in behavior. He drinks heavily, neglects his family, and apparently is doing everything he can think of to escape from himself. Naturally his work is suffering, and it is impossible to predict how long he can continue in this manner. But he is so dispirited by what he feels is clearly a demotion that he has encased himself in a subjective shell, and no one can talk to him about it. He is in his early forties now, just approaching the age where he has maturity and experience enough for real accomplishment, if he could only see that nothing is the matter with him, that the problem hinges on the fact that the real executive and real engineer by nature are not interchangeable. But he does not have the vocabulary to see what is the matter and to rise above it.

On the other hand an engineer with a large aircraft company who had a similar experience has reoriented his ideas about himself and is now happily adjusted. After being put in an executive position, he was taken out of it because he did not do well in it and was placed in engineering research. When he came to

be tested, he thought in some way he had failed. He tested as an engineer with high vocabulary. To him, just knowing he is extremely subjective has changed his ideas and he has gone back to his engineering work with new ambition and zest.

But industry gives these promotions constantly without being aware of the harm done to personnel or without realizing that they slow down their own progress by not making fuller use of their best engineering talent. This is a point the human engineers are trying hard to make industry grasp, for it is not mere theory, but a conclusion drawn only after testing many thousands of people, after long research and many follow-up studies. The Laboratory's findings point convincingly to the fact that our systems of promotion in industry *must* be changed, and that new methods and standards must be created to accompany the advance of a highly industrialized civilization.

While ideally the "born" engineer should not attempt straight executive work, what happens if he is already in an administrative position and does not want to leave it? This sometimes occurs in firms whose personnel and problems are largely engineering. When the work combines engineering problems with administration, there are adjustments that can be made. For instance, a few years ago the assistant superintendent of a large oil refinery was tested in Chicago. He was experiencing so much inferiority and difficulty in his work that he took the tests to see if he could find out what was the matter. He tested as an engineer, with fairly high vocabulary. From his description of the superintendent, however, it was quite obvious that the latter was the typical executive, objective with little structural visualization. The assistant, on the other hand, selected for his job because he was such a good engineer, was trying to behave exactly like his boss. He was slated for the superintendent's job, with the superintendent moving up to a vice-presidency, and he felt that to get it he must be as

much like the superintendent as possible. So he was making a wreck of himself trying to be what he was not. He was working so hard at being the "hail fellow" that his work was being neglected, and, of course, trying to be objective was causing him to feel unnatural and self-conscious.

He was a little irritated about testing subjective, because he did not want it that way. He said he had his heart set on becoming the plant superintendent. He was told he could do this if he would limit himself to the engineering aspects of his job and would employ an objective assistant to handle the bulk of administrative details. Ideally the assistant should be on an equal vocabulary level, so they could understand each other and could work together as a team. In this way he could be superintendent and still an engineer, while the assistant would perform those jobs that involved handling people.

He came back recently to tell the human engineers he was now superintendent, and that the plan seemed to be working out satisfactorily. He said also that in trying to be himself instead of aping his former boss, the attitude of people within the plant seemed to have changed toward him, and he felt he was commanding more respect and confidence.

A few years ago the Laboratory tested eighty executives for a manufacturing organization of three thousand employees. The president was a graduate engineer who scored extremely subjective, with strong structural visualization and an excellent vocabulary. On the surface it would appear that he refutes the belief that the "born" engineer does not fit into executive work. Actually the firm itself was built up on engineering problems, and the president always has been the engineering brain of his organization. But long ago he realized his limitations in dealing with others and in handling many executive matters, and he turned over the objective phases of his job, such as labor

relations, customer contacts, and the like, to a vice-president, who scores as a perfect executive.

In any field of work it is difficult to combine structural visualization with objective personality. In the engineering field, perhaps architecture and construction engineering would come closest to using both structural talent and the ability to work effectively with others. However, in a firm working largely with engineering problems, the objective, high-structural person can handle the executive work, provided his job includes both structural work and administration. The extremely objective person with strong structure can be a sales engineer. The subjective person can, too, if he does it in a consultant capacity. In many organizations dealing primarily in engineering products, the engineer may sell successfully, but only because he is dealing in a specialty about which he is an authority, and because he gives out advice and service rather than actually exercising salesmanship. Selling in general belongs to the objective person.

Recently the New York Laboratory tested a West Point graduate who for the past five years has been on active duty in the Army as a colonel. His job has been the instruction of manufacturers and other concerns on how to do business with the Army. He is in his late forties now and, like countless others, is faced with the puzzle of where to fit into civilian life. He had been a sales engineer for a machinery firm, but he was restless and welcomed going back into the Army to get away from his job. Although offered his old job back, he did not relish the thought of going back to something from which he was so glad to get away. Yet readjusting at almost fifty is no small problem.

He tested objective with very high structural visualization, and many other strong aptitudes, including creative imagina-

tion, number memory, analytical reasoning, and visual imagination. Although high in the vocabulary of business and finance, he scored low in general knowledge. Because of his objectivity and structure and his many other high aptitudes, he decided to go back to his old company, but in a different type of sales engineering. With his aptitudes he would need a changing panorama of structural problems, so he plans to serve as a liaison officer between the company and the customers, going from plant to plant unraveling structural snarls, but never remaining in the same place after a tangle is smoothed out. Vocabulary is his chief stumbling block, and although he has gone to work on it, his success will depend in great measure on his gain of general knowledge.

This lack of vocabulary is not always the fault of the engineers, for the mistake may have occurred early in life. As a youngster a person with strong structural ability often would much rather make things with his hands, particularly if he has strong hand dexterities, than spend time reading or building up general knowledge. Unless he is encouraged in it, or even forced to do it, he may unwittingly neglect this vital part of his development, and it shows up in later years. Just having talent is not enough; we must have knowledge to solve problems of any scope; and everyone knows the world today offers many structural problems to be solved.

As an example of how lack of knowledge can hold back work on some of these problems, there is the story of a forty-two-year-old engineer who had been product supervisor for a large agricultural manufacturing concern at \$12,000 a year. When he was tested in Fort Worth recently, he was bitter toward life and felt it had given him a raw deal. His company recently had merged and in the process he had lost his job to another man and was put in a much lesser position. In a huff he had quit, but he was deeply hurt, puzzled, and could not under-

stand what really had happened. He tested objective with strong structure and a brilliant array of high aptitudes—creative imagination, observation, tapping, analytical and inductive reasoning. But he was very low vocabulary. He was told that low vocabulary probably was the cause of his entire trouble, that the Laboratory has found that demoting and sifting out of low-vocabulary men invariably occurs in industrial shakeups.

Since this type of demotion shatters self-confidence, among low-vocabulary persons the common defense is to assume that someone in the company holds a grudge against them and is trying to get even, that they are being discriminated against. How many times have you heard that kind of story? While in rare instances it may be true, the chances are that the real reason is low vocabulary.

This man had succeeded early in industry because of his many strong aptitudes. But now that he was reaching an age where knowledge counts, he was finding he could not make the grade.

He had too many aptitudes to be satisfied with a routine job. Furthermore, when a man is in his forties and contemplates a major job change, it is best for him to try to build up something of his own. He was advised to select some broad structural problem that interested him and to go to work on its solution. He had everything he needed except vocabulary, and with persistence and hard work this could be acquired.

While discussing problems with him, it developed that one problem interested him intensely, and he felt someone should really do something about it. This was the possibilities for agricultural developments in war-torn countries, to recondition soil to again produce crops. When he was asked why he did not make it his problem, he thought it absurd. Yet the problem really interests him, he has the agricultural engineering background and connections, he wants to make a change, but he

lacks the vocabulary to see the job or his own possibilities in it. He does not realize that every problem solved necessarily must have some person to begin the solution. He cannot see that vocabulary matters in the least and still feels bitterly that there must have been some personal grudge somewhere in his organization that caused his demotion. So he probably will continue trying to work in some standard type of job, slipping back slowly and ending up doing little at all. Yet the sad part is that here is a rare person who has every tool he needs to work with to build up a thrilling, stimulating, and really useful life for himself, but unfortunately he lacks the knowledge to think on a broad enough scale.

These are exciting days for the "born" engineer. Just think what lies ahead for him in the development and use of atomic energy and electronics. Is there anything we have yet developed that could not be improved? So much of this future world improvement lies with our engineers and the knowledge they possess.

The Factory Worker

STRIKES and general unrest among factory workers must mean that basically something is wrong in our industrial life. While it is true that money and desirable working conditions are important, the roots of unrest probably lie deeper.

In the first place, we are social creatures; instinctively we crave teamwork with our fellow men. If our work gives us that, plus progress and development of ourselves, other matters assume less importance. But not only has mass production in general done away with the feeling of teamwork, in addition it causes many persons to work at jobs that use but one or two of their aptitudes. They come to feel they are standing still with nothing ahead for them; they have no conviction that management is interested in them as individuals but rather in the work it extracts from them. Thus they feel restless and antagonistic and think perhaps that more money and more leisure will be the answer. But it is not the real answer, and anyone who looks beneath the surface knows that it is not. The proof is that when they get more money and more leisure, they still are dissatisfied, although they may not know why. The human engineers believe the real reason is unused aptitudes importuning for fulfillment.

We have put so much stress on producing materials that we have overlooked the human factor. We have tried to make robots of men. This theory is contrary to all that is basic and natural in us. After all, each of us is an individual with hopes,

dreams, and ambitions; the life of each of us is our own little universe with our work the most vital part of it. When we build our world about persons and their development, perhaps then we shall see an end to many of humanity's conflicts.

If factory workers knew their own strong points and limitations and had help from their superiors in using and developing their strengths within the organization; if they were encouraged to gain knowledge, and those who do elevated to jobs compatible with both vocabulary increase and aptitudes; if they were encouraged to grow with an organization and made to feel a real part of it through more tangible ways than periodic and detached pep talks from management, perhaps then the world soon could be a different sort of place than we know it today.

We have forgotten that it is human to want to work in teams, to be a part of a group working toward a common goal. Outstanding in what can be accomplished by doing this is seen in a large Southern manufacturing company, where the employees have been divided into small congenial groups, each group producing the finished product. Each person does his specific job and feels deeply responsible for his part in completing the process. Important, too, is the fact that they exchange jobs with each other, and after working a few hours at their regular task, they trade for a while, so no one must spend his whole day doing the same thing. There is almost no absenteeism, for anyone who stays home realizes he throws a burden on the rest of his group, who are his friends. If one of the group is ill, the others will not let an outsider come in, but all pitch in and do his job for him. This plant has had no labor trouble, production is unusually high, and morale is excellent.

This, of course, is not the complete answer by any means, for there still is the problem of unused aptitudes and the need

for self-development that tortures particularly the person with strong aptitudes and an inner drive to go ahead. If such people knew their aptitudes, they would know what type of work they could do best and would work toward its development. For instance, there was a man tested in Chicago some time ago who at that time was employed in a minor assembling job, using only his tweezers dexterity. He tested with strong structural visualization, which he did not know he had and which he never had tried to use. He decided to develop it and began by going into a metallurgical shop to learn from the ground up. Next, he worked for three years as a corrugating-machine slitterman. But he grew tired of that, and because he knew his structural visualization would enable him to learn to read a blueprint easily, he took a job with a small screw machine company. He found the work so easy that in three weeks he applied for a job with a large railway equipment manufacturing company. For several years now he has been working there as an experienced hand screw machine operator, making a high salary. He feels he is just beginning, that his present work is but background for more advanced technical work in the company, and he is studying engineering at night school.

While it is important for the individual to understand his capabilities, it is necessary for management to know which jobs utilize which aptitudes so the two can be fitted together. Countless misplacements in industry are due to the failure to analyze what aptitudes a job embraces. This can be illustrated by the order of promotions in a woolen mill, which go from weaver to loom-fixer to second hand (subforeman). To be outstanding in one of these jobs indicates that you have the aptitudes for it, and, of course, the best in each group are automatically elevated to the next rank. Yet each of these jobs requires an entirely different set of aptitudes. Most opposing are loom-fixer and subforeman. The expert loom-fixer needs

subjectivity with high structural visualization; the good sub-foreman needs the exact opposite, or objectivity and low structural visualization. Yet the best loom-fixers eventually reach the subforeman job for which they are often totally unfitted. Recently the management of a woolen mill complained to the human engineers that they could not understand why they had so much labor trouble and turnover in personnel. Salaries were unusually high, working conditions exceptionally good. Yet invariably they found that when their best loom-fixers were made subforemen, generally they were so poor that either they were put back into loom-fixing, which made them feel demoted, or they were so dissatisfied they quit. Usually the management ended up by bringing in foremen from the outside, which only served to create greater dissension and antagonism within the plant.

You will remember the Human Engineering Laboratory was born in a large industrial plant and had its early growth there. Thus many of its answers to industrial problems are not mere "ivory tower" theories, but realities based on research into the talents of thousands of people drawn from both management and labor. And although the staff of the Laboratory would be the first to insist that they have only tapped the surface of these problems, a few basic facts already are helpful toward understanding the human relationships of factory jobs.

In general, factory workers doing individual jobs need to be subjective to enjoy working alone. If the work is mechanical or structural, structural visualization is needed. Since many factory jobs involve using the hands, finger or tweezers dexterity is essential. These two aptitudes are entirely different, and even if you have nimble fingers, you can be clumsy with small tools or vice versa. The tests for these two aptitudes were some of the first developed at the General Electric Company, and in many instances it was found that changing people to the

jobs for which they had the proper hand dexterity made an astonishing difference.

Inspectors of industrial products need observation most of all. The test for this aptitude was designed to help select people in a plant who could see at a glance if things were not as they should be. With this aptitude an inspector quickly spots defects of all kinds, which, of course, helps raise manufacturing standards, cuts cost in waste of inspecting time, and helps to do away with customer complaints.

The supervisory, executive, or teaching jobs in a factory belong to the objective. In fact, objective or subjective personality enters strongly into the type of factory work we should do. While the lone worker needs subjectivity to enjoy working quietly by himself, an extremely objective person may want to visit most of the time and, among subjective coworkers, may be greeted with an unresponsiveness that baffles him and that makes him feel something is wrong with himself.

An extremely objective man who was tested is now working in a subjective structural job in a factory, but he understands his position and makes allowances for it. His story, although in a sense amusing, shows just how necessary an understanding of our real personality can be. When he was tested in Chicago, he was a fireman on a train on a small line running out of Chicago. He was nervous, bewildered, with his self-confidence at a low ebb when he was tested. He told the human engineers he was positive something was terribly wrong with him. It seems that out on the lonely stretches of an Illinois prairie, with only the train engineer for a companion, he would get lonesome and would want to talk. The engineer would have nothing to do with him and greeted his attempts at conversation with terse grunts or mere silence. It was worrying him, because he couldn't determine what was wrong since the engineer refused to talk to him and always seemed angry.

He scored extremely objective with many strong talents including structural visualization and ideaphoria, but with low vocabulary. It was pointed out to him that his gregarious nature made him crave companionship, while the engineer undoubtedly was extremely subjective and wanted to be left alone. Undoubtedly he had a low vocabulary also, judging from his behavior. With both of them low vocabulary and at opposite ends of the pole in personality, it is small wonder that they could not get along. The engineer was annoyed by the fireman's incessant chatter, while the fireman thought the engineer was angry with him!

He was advised to leave his fireman's job, for it was too subjective and not in keeping with his many talents. He had a sincere desire to make more of his life but needed money to go on with his education. He decided to capitalize on his structural visualization and took a job as mechanic in a large factory, meanwhile going to night school to secure technical training. So while he is now in a subjective job, he realizes it is temporary. He hopes to stay right in the same factory, but eventually with more knowledge and background he wants to get into work that not only will involve structural problems, but will use his strong group-influencing possibilities.

If we analyze the jobs in a large factory, we can see that nearly any aptitude pattern can be used, so for the worker who aspires to rise above the usual factory work, there are many possibilities. One of the newest findings of the Human Engineering Laboratory is the usefulness of the number memory aptitude, which enters into all the so-called "production" jobs.

The purchasing agent needs it as his primary trait. The purchasing agent's job involves much financial responsibility, provided the president is a real executive who delegates author-

ity; but if the president must pass on every detail, the purchasing agent becomes little more than a clerk.

Working for the purchasing agent is the chaser or expediter, who needs number memory and a group-influencing pattern. His job is not to be underestimated, for the work of thousands can depend upon him. He sees to it that materials ordered arrive when they should. One large plant with an apparently poor expediter was delayed because an order of tiny machine parts did not turn up for some time, which forced them to lay off several thousand workers for ten weeks until the parts were finally delivered, and production could continue.

The production follower works for the manufacturer to see that goods are delivered when promised. He needs number memory most of all. Because he must keep involved accounts, it would seem that accounting aptitude should be his strongest trait rather than number memory. Actually he is always ahead of written accounts and must keep many figures in his head. Here the difference between intellectual reasoning and actual measurement becomes apparent; in research often results turn out different from what seems reasonable, and the only way the human engineers can tell which is right is that they have thirty thousand people a year with which to experiment.

The production planner needs number memory and an executive aptitude pattern. When the orders come in, his job is to forecast when they can be delivered. In a well-run plant every machine is scheduled long ahead, and a real production planner can predict almost exactly when an order can be delivered.

Probably one of the greatest wastes in business today is the depression following peaks of production which industry has come to take for granted, but which plays havoc with the lives of countless people. If industry cannot save up enough to

carry personnel through a depression, how can they expect a worker to save up enough to carry himself through? With expert production control in industry, ultimately these ups and downs could be eliminated. The production control man in general needs an objective personality and number memory. The subjective person should go into production control only if he goes into it as a life's problem of leveling out production.

There is much talent going to waste in our factories. A great many people who work in them are hampered by a lack of education and the urgent need for money. Probably many do not belong in factories at all and should, perhaps, start businesses of their own. Some of these, through learning their real abilities and thus gaining both confidence and self-insight, have left factory work for more suitable and self-expressive occupations.

A man who had been a sheet metal worker for ten years was tested in New York. Since economic necessity had demanded that he go to work at an early age and since he had only a tenth-grade education at the time, factory work had been about all that was open to him. But he became vaguely dissatisfied, and learning about the Laboratory, came to be tested.

Although he scored low in the English vocabulary test, he surprised the test administrator by scoring an A in the art technical vocabulary. He had never had any art training, although he painted as a hobby. He had strong art talent, much inductive reasoning, average accounting aptitude, an extremely objective personality, and low structural visualization; certainly not a suitable set of aptitudes for a sheet metal worker, who would need primarily subjectivity with high structural visualization. He had much visual imagination (the ability to see a distant goal and stick to it) which characterizes people who open and operate their own business successfully. With con-

fidence that he could do it, and making use also of his sheet metal training, he has opened his own engraving business, which he is operating successfully, and which uses many of his aptitudes. He is happier than he ever has been, is trying to build up both his knowledge and his business. Yet if he had not discovered what he really had in the way of ability, he might have gone on indefinitely as a dissatisfied, and not a very good, sheet metal worker.

A young girl who operated a turret lathe during the war was recently tested in Los Angeles. When she learned she had executive possibilities but was low in vocabulary, she took the money she had saved and went back to school, planning some-day to be an executive.

Several hundred industrial organizations now use the human engineers' aptitude tests regularly. Many of these are learning to interpret the Laboratory's findings in the light of jobs within the plant, and with excellent results. One manufacturer told Johnson O'Connor that during the eight years the Laboratory has been testing and suggesting where his employees might fit, no one has proved an out-and-out misfit. But although constantly requested by industry to test applicants for employment, the human engineers will not do it. They do not believe in testing applicants for specific jobs. Only one person in about one hundred thousand fits a specified aptitude pattern, so to continue to test persons until those with exactly the wanted aptitudes are found, would be a long, slow, and expensive procedure.

The human engineers believe in interviewing applicants, hiring those that seem to fit into the organization, and putting them in any job. Then they should be tested and fitted as closely as possible into jobs commensurate with aptitudes and experience, with management planning ahead for their future. They believe promotions should come from within the plant,

using people already on the payroll, and that every year each person should be encouraged to use another aptitude.

We have such vast human resources in our factories that great good could come from them were they developed.

The Successful Banker

IN many communities the banker is a person of no small importance among his fellow citizens, and because people have confidence in him, his job often extends beyond financial counsel, and his advice is sought on matters far removed from banking. Thus he may occupy a unique position of prestige and trust which he can exercise for greater general good than he may realize. Not only in the postwar readjustment period, but at all times he can use his position and influence to help people get into work suitable to their talents. Since he knows his depositors, their businesses, and many of their needs, what could be more practical than his serving as a go-between, a dealer in human assets? He is close to the heart of industry and knows what business can or cannot afford to do. If he knows aptitudes, it is a relatively simple matter for him to help synchronize the three—people, industry, and aptitudes.

Banking offers an ideal field for this. A bank itself uses a very limited aptitude pattern, namely, high accounting, objectivity, and low structural visualization. Many persons hired by a bank have other aptitudes which cannot be developed in banking and which make for discontent and dissatisfaction. Also, many persons consult their banker about careers, starting businesses of their own, and other work problems. A bank has such direct contact with every kind of business using almost any aptitude pattern, that the possibilities of placing people in work suited to them are unlimited. And this fuller utilization

of human assets can perform a great service not only to the individuals in expressing themselves through compatible work, but depositors would be benefited by strengthening their businesses, which in turn ultimately would reflect favorably on the bank.

That such a plan really works is illustrated by the story of a New Jersey banker who for over twelve years has been doing just this, placing people in jobs with depositors on the strength of their aptitude scores. His story is interesting, too, from the standpoint that it reveals how cautiously many of us accept new discoveries, and how we prefer to see results to be convinced of their merit. This banker is William F. Hofmayer, president of the First National Bank of Union City, New Jersey.

Mr. Hofmayer as a person refutes any belief that a banker is without heart and human warmth, for he has helped more people than anyone ever will know about. Perhaps this desire to be of concrete help to others stems from his own background, for he grew up the hard way, going to work when he was twelve to help support the family. His background of early struggles and eventual success is one he never has forgotten, and has served to make him deeply conscious of other persons' problems. We tell you this only to give you some idea of the man himself, for it adds greater meaning to what he is trying to accomplish. We believe that anyone who, solely through his own efforts, can raise himself up from abject poverty to become a successful and beloved bank president must have vision and common sense.

About fourteen years ago Mr. Hofmayer assumed the presidency of a four-million-dollar bank and a business which was far from commensurate. Many banks at that time were confronted with the same problem, so the American Bankers Association made a survey to determine the best means to bring in new business. Their findings indicated that personnel

was the main factor that, in general, banks should concentrate on improving the quality of their employees. With this survey in mind Mr. Hofmayer had a cost analyst examine his bank, and he, too, came forth with the conclusion that personnel was the key to the situation. If he would increase his business, he must first place people in jobs for which they were best fitted. How to go about doing this concerned Mr. Hofmayer greatly, for many who he had thought were right for the bank had not turned out the way he hoped they would. So he began to cast about for new ideas to determine who should have what job.

It so happened that at this same time a depositor consulted him about where his boy should go to college. Mr. Hofmayer loved farming; his grandfather had been graduated from an agricultural college, and it had always been his ambition to go to an agricultural college, too. He knew of the work at Rutgers University, College of Agriculture, and suggested that the boy go there and take up agriculture as a career. The boy enrolled but did poorly and loathed the work. Since he did not know what he should do, the dean suggested he take the aptitude tests at the Human Engineering Laboratory. He tested as an engineer, shifted to engineering school, where he did very well and where he liked the work. This experience started Mr. Hofmayer thinking, and he decided to experiment with a business-development campaign of his own devising.

The depression was in full swing. He knew many young men graduating from college were having a hard time finding jobs. So he wrote to a dozen of the leading colleges and asked them to nominate men who were best suited to banking. He would pay all expenses for them to come for interviews. The response was immediate and enthusiastic. For many days he talked with these new graduates, sifting the number down to the fifteen whom he really liked and who were precisely the caliber

of man that the bank needed. He hired them all, then sent them to the Laboratory to find out where in the bank each man would do the best work.

He told us it was a revelatory experience and a turning point in his understanding of people and their jobs. The first man he sent to take the tests was a quiet, studious Phi Beta Kappa who Mr. Hofmayer was certain was ideal for the bank. You can imagine his surprise when Johnson O'Connor telephoned him to say that the man definitely did not belong in a bank. As we mentioned before, unlike most industries, banking requires a limited aptitude pattern, and accounting aptitude necessarily is the strongest trait used. This man scored much higher in creative imagination and inductive reasoning than in accounting aptitude, and, with his high vocabulary and natural scholastic interests, obviously was fitted much better to college teaching. Mr. Hofmayer was a little annoyed when Mr. O'Connor told him this. He knew little about aptitudes so he reserved his judgment and sent the next man to be tested.

But again Mr. O'Connor telephoned him. "This man won't do," he warned. "If you put him in the bank you'll not only waste his time but your own. He scores as a perfect engineer with 100 per cent structural visualization. If there is one aptitude completely wrong for banking that probably is it."

This was only the beginning. When all fifteen had been tested, the report came in that only two had the aptitudes for successful banking—accounting aptitude, objectivity, low structural visualization, and for tellers, high finger dexterity. But by then Mr. Hofmayer said he had gone to so much trouble and expense to locate and hire the men, and that he knew they were counting on working with him, so he decided to forget about aptitudes and put them all to work.

The Phi Beta Kappa did such poor work and was so dissatisfied that after a few months Mr. Hofmayer decided he

could not keep him. They took out his aptitude scores and studied them carefully. The boy admitted that in his heart he always had thought he might like college teaching, but everyone had urged him to try business. These few months had convinced him it was not for him. He went back to college, secured his Ph.D., and became a capable professor.

The second man was kept by the bank as long as possible. He had come with splendid recommendations. One of seven children of a letter carrier, he had worked his way through college, graduating with honors. Mr. Hofmayer believed that any boy who could do that was raw material easily molded into a success in any field. But the boy was not happy. He made mistakes; he was nervous dealing with customers. Finally they both decided something would have to be done. Mr. Hofmayer did not want to turn the boy loose without a job; he wanted to help him get started in the right career, where he could develop himself to the fullest. He telephoned Mr. O'Connor and together they went over the boy's aptitude scores. With such strong engineering talent and hand dexterities, and his below-average accounting aptitude, it seemed logical that the boy should begin in a factory working at a bench.

Where to put him was a problem, but one day at a Rotary Club meeting Mr. Hofmayer told the boy's story to one of his depositors, a president of a factory. He asked him to hire the boy. The president was extremely skeptical; he did not believe anyone could shift satisfactorily from a bank to a factory bench, particularly with no mechanical training, and he had a long waiting list of engineers who wanted jobs. But as a favor to Mr. Hofmayer, he agreed to hire him. Without acquainting the boy with the arrangements, he was sent to the president and was hired.

Some months later Mr. Hofmayer happened to see the factory president and asked him a little nervously if the boy was

doing satisfactory work. He said he was amazed when the president put a friendly hand on his shoulder and replied earnestly, "Will, you know I'm a graduate engineer and as my banker you know I'm a successful one. You know also that my two sons are successful engineers in their own businesses. But let me tell you this. If either of my boys had half the ability of that boy, I'd be so proud I wouldn't speak to you!"

Mr. Hofmayer had similar experiences with the other men who, as the human engineers had cautioned, by reason of their aptitudes did not belong in banking. It turned out over a period of years that the only two who stayed with the bank and did excellent work were the two with banking aptitudes.

As he saw that the aptitude tests seemed to work out practically, he began to use them in shifting about his personnel into jobs most in keeping with their aptitudes. The bank's efficiency more than doubled. He put all objective employees out front, where they could deal with people, and gave the subjective ones the more isolated jobs. He made certain all had accounting aptitude as their strongest trait. And one of the first things he did was to place with his depositors all his employees with high structural visualization, for while this aptitude is a badly needed asset in industry, it is a real liability to a banker.

In a manufacturing community it was not too difficult to place these high-structural people. One man he released had held down only a minor clerical job for some years. He is now superintendent of a plant. Another man with exceptionally high structural visualization, in a position of no importance in the bank, was a problem to place, for the general feeling was that Mr. Hofmayer was trying to get rid of him by wishing him off on someone else. He approached six manufacturers before he found one willing to take the gamble. Even then he was forced to make up the difference in salary and guarantee that he would take the man back in a specified time if he were to prove

unsatisfactory. This man is now head of the plant's methods department and is one of their most valuable employees.

As a joke, yet with some seriousness behind it, the board of directors of the bank and Mr. Hofmayer decided to test the Laboratory. They selected a girl employee who they knew from experience was right for the bank, for she had always been one of their most competent workers. They sent her to be tested, she to pose as someone just hired. Mr. O'Connor's voice rang with enthusiasm when he telephoned Mr. Hofmayer, "By all means keep that girl in your bank! She's perfect!"

By now Mr. Hofmayer has sent over four hundred persons to take the aptitude tests. If their aptitude pattern does not fit the bank, he places them in suitable jobs with depositors. It has become a hobby with him that is proving of real worth. In addition to helping individuals to greater happiness and self-expression in their work, and naturally to increased financial earnings, the bank has improved its own aptitude pattern and has added to the success of many depositors, who in turn have made greater use of the bank's services.

Since accounting aptitude indicates the ability to handle figures and symbols with ease, it is apparent why it should be the primary trait of a banker. When the Laboratory tested the payroll of a large New York bank, 83 per cent scored A or B in accounting aptitude. And when eighty successful bank employees were tested in Chicago, every one scored high in accounting aptitude, were not extremely subjective, and had below-average structural visualization.

Yet, while accounting aptitude is essential, it necessarily need not be always at A or B level. It is the *relative importance* of our aptitudes that matters. One bank president scores with very high vocabulary, objectivity, and D-plus accounting aptitude, with his remaining aptitudes all D. He has the vocabulary and objectivity needed by the executive and accounting still is his

highest aptitude. Another man with only 40 per cent accounting aptitude, but with still lower structural visualization, is now a well-established financial executive. Of five other men who started out with him and who all scored higher in accounting aptitude, but with even stronger structural visualization, all failed at banking. Yet considering accounting aptitude alone, it would be natural to conclude that the five with more accounting aptitude would be better bankers. However, it is important to remember that it is always the relative dominance that is significant.

Why high structural visualization is wrong for banking can be only surmised. It was through testing many bank employees that the following hypothesis came to light. A low score in structural visualization means the presence of an opposite trait that the human engineers call "abstract visualization," and probably the ultimate success of a banker depends upon his ability to weigh such abstract qualities as honesty, perseverance, capability, and integrity. While the human engineers do have enough evidence to insist that strong structural visualization is a handicap in banking, they also tell us that if it happens that our knowledge and experience lie in banking, and it is learned belatedly that we have structural visualization, we should regard it as an asset to be used in some constructive manner. One man with both high accounting aptitude and structural visualization has made a unique place for himself in banking. He is a full-time technical adviser to a large bank, and he travels extensively investigating engineering enterprises and surveying plants wanting loans.

But, in general, structural visualization does not belong in banking, and often tragic cases arise to confirm it. A man tested recently in St. Louis found himself out of a job at the age of fifty. He had begun as a messenger boy in a bank and had worked up to be treasurer, then lost the job. Because he had

such an excellent record, he was made comptroller for a small factory, but after ten years he lost this job, too. It was then that he came to be tested. He was greatly surprised to learn that he scored as an ideal engineer.

In discussing his problems with the test administrator, he mentioned that for some years, purely as a pastime on weekends, he had conducted a construction project of sufficient importance to be written up in New York newspapers and national magazines. This, of course, hinged solely on his exceptional engineering talent. Yet because he enjoyed this and thought of it only as a hobby, it never had occurred to him that this type of thing should have been his life's work, that structural visualization should have been his guiding star. And he could not have selected more unsuitable work for engineering talent than banking and a comptroller's job.

Because banking involves a certain amount of dealing with people, the ideal banker should not be extremely subjective. A phase of banking that does use subjectivity with strong accounting aptitude is statistical research. And while low creative imagination is an asset to most bankers, one with strong ideaphoria can make a place for himself. With the nations of the world becoming more interdependent, those who want to go into banking and who have in addition to strong accounting aptitude a salesman's aptitude pattern, should look ahead to some aspect of international banking.

But banking in general uses a limited aptitude pattern, which may not afford sufficient outlet for a person with extra aptitudes. Then too, most people who enter banking as a career aspire to become banking executives, and the aptitudes needed here are strong accounting aptitude, objectivity, analytical reasoning, low structural visualization, and an extensive vocabulary. But should the goal of bank president be reached, unused aptitudes crying for fulfillment may make their possessor rest-

less and dissatisfied; or even if all aptitudes are expressed, the banker may feel he wishes to give more to life.

For instance, a rural bank president, tested recently in Tulsa, proved to have the ideal banking executive aptitude pattern. Yet he took the tests to help decide whether he should sell out his bank to a large financial house and should go into fund-raising work. He lacked the aptitudes needed for effective fund-raising work, but his desire to be of greater help in the world prompted him to think along those lines. He was advised to remain a bank president, but to use his humanitarian desires to help his personnel and other persons in the community, to aid them in finding greater happiness and success in their work. As a banker he already had influence and prestige, and in that capacity could accomplish much more than an inferior solicitor of funds.

The test administrator told him about Mr. Hofmayer, and also about another banker who, when a number of college graduates whom he had hired and had tested proved to be unfitted for banking, decided to really help them. He liked every one of them, which is why he had hired them in the first place. So he studied their backgrounds, talked with them about their hopes and ambitions, and went over their possibilities based on aptitudes. He knew that all many of us need is a start in the right direction. So he set about to find every one of them a job with various depositors. He placed them all, and they are all in work quite removed from banking—real estate, the aluminum business, tool manufacturing, and so on. It is gratifying to him that not one has failed to turn out well in the new positions. The rural bank president who listened to these stories decided to keep his bank and to see what he could do to help his own personnel and the community.

A banking executive must be equal to exercising sound judgment since the financial affairs of so many depend on him,

and since persons do seek his advice on many matters of prime importance to their lives. Thus it is imperative for him to have wide knowledge—knowledge that permits him to grasp the basic issues of life rather than to think in terms of financial assets only. With the dire need that our world has of increasing our understanding of people, surely any banker with knowledge will not overlook the immense help he can be in developing our human assets.

Medicine and Health

WARTIME shortages of physicians and other health workers impressed upon us the value of the medical, dental, and public health work to which we have become accustomed. The advances made in these fields are amazing, particularly when we realize it is only within the last seventy years or so that treatment of diseases has moved from the stage of superstition to an intelligent scientific control now spreading gradually throughout the world. This solid foundation of scientific medical knowledge already has produced remarkable results. It has achieved a lengthening of our life span, survival of more babies, and fewer deaths of women in childbirth. Unbelievably delicate operations are performed successfully; inoculations immunize against specific diseases; and many dietary deficiency diseases can be corrected or avoided. New cures for diseases, such as the sulfa drugs, penicillin, and more recently gramicidin, offer new hope to many. Public health inspections are accepted as commonplace, and sanitary measures are enforced by law. Advances have been made in treating mental diseases; dentistry displays ever refined techniques; and modern hospitals are health centers rather than the last resort of the dying as in the past. In fact the whole field is shifting from defense to prevention.

Yet behind all these accomplishments lies a background of increasing scientific medical knowledge that began in the minds of men such as Pasteur, who had courage enough to question

superstitious treatment of disease, and who by reason and experiment set about to lay the foundation of factual medical knowledge as we know it today. During the war the Army and Navy made great strides in medical knowledge and methods of practice, which, if carried over to civilian life, could be highly advantageous to all of us. While much has been accomplished, much still remains to be done, and entirely new fields of medicine may yet be discovered. All future advances lie not only in the people engaged in these works and in their knowledge, skill, and aptitudes, but in the cooperation of the rest of us in helping to overcome outmoded ways and to abolish quackery and superstition.

While we may never see the researchers behind the scenes, most of us do come in contact with those who put the discoveries of medical science to practical use. In work of this kind, where often human life is at stake, the necessity of the right aptitudes for the work cannot be overemphasized. The doctor, and particularly the surgeon, must often rely on instincts—it is true we can depend somewhat on reasoning and skill if there is plenty of time, but in an emergency the doctor or surgeon does not have time. It is then that his natural abilities come into play, for he can work under pressure if he has the right aptitudes for his work and is not depending solely on an acquired skill. And who has not had experiences with both good and poor doctors, surgeons, and dentists? While there are many competent ones, there are some who are only mediocre and who probably need to make an adjustment within their field, for our sakes, and for the sake of their own contentment and success.

Probably the doctor, dentist, or surgeon with an abundance of scientific knowledge and skill but with a small and unsuccessful practice has only himself to blame. Like the engineer, he needs to understand the value of human relationships and

to learn how to get along with people. The capable doctor understands the importance of psychology in the treatment of the ill, and psychosomatic medicine corroborates what a vital part the mind plays in many of our ailments. While we may refer jokingly to a doctor's bedside manner, isn't the true bedside manner only the ability to get along well with all types of people, to be sympathetic and understanding of their problems? This ability to get along well with persons from all walks of life comes from an extensive knowledge that stretches far beyond a specialized field. For knowledge of the world, of people, and what makes them tick, a wide vocabulary is essential. The doctor should possess this in addition to a vast and growing knowledge in his specialized field. It is the illusive quality in doctors, surgeons, and dentists that promotes patients' faith and confidence, for it makes them feel that they are really understood and they are in the care of capable persons. Since a high vocabulary and wide knowledge result in an ability to take a broad viewpoint on life, the doctor himself must have this in relation to his work, or the individual tragedies in his job assume undue importance.

In the field of health, we come in direct contact most often with the general practitioner, or diagnostician, and the dentist. From the standpoint of aptitudes the general doctor needs high inductive reasoning most of all. He needs this aptitude to be able to examine patients, then take that pain in the head, chest, or stomach, or wherever, and to link all his findings to form a logical conclusion so he can administer or recommend proper treatment. While structural visualization is not so essential to him as to the surgeon, he should be at least average in this in order to understand his basic medical courses. Then he should be subjective to pursue these studies with the intensity needed to gain such vast specialized knowledge and to be content working with the individual rather than with groups of people.

To handle his medical instruments adroitly in making examinations, finger or tweezers dexterity is desirable, although tweezers dexterity is not so essential to him as to the surgeon, who must possess it to a high degree. A doctor needs low creative imagination to keep from going off on feckless tangents in his diagnoses. Then for his own sake, since irregular hours make large drains on physical energy, it might be well for him to score high in both muscular speed and grip, indicative of physical strength and endurance.

Often the doctor who is not subjective, even though he may have applied himself to gain an excellent medical background, may experience restlessness and boredom with private practice and may not know why. A number of years ago a well-known diagnostician was tested in Boston. He could not understand why he was so discontented, for he had an extensive and prosperous practice. He did realize, however, that he was not giving his help to the persons who he felt needed it most. His reputation and the location of his office were such that poorer people were afraid to seek him out.

He scored as a diagnostician, except that he was extremely objective. He tested very high in both English vocabulary and the vocabulary of medicine. When it was suggested that he open and operate a public clinic, he could not understand why he had not thought of that himself. It would do two things for him. It would enable him to work with groups of people and also would satisfy his desire to be of greater help. He has done this, dividing his time between private practice and the operation of his clinic.

Dentists and surgeons—also dental hygienists and research workers, such as anatomists and physiologists—need approximately the same aptitudes since all depend largely upon structural visualization, tweezers dexterity, and extremely subjective personality. The importance of high structural visualization to

a surgeon is obvious. This ability to picture solids in three dimensions assumes great proportions when the incision is in our own flesh, and we want our surgeon to know within a hair's breadth precisely just where and how deep to cut!

As for tweezer dexterity, it can mean the difference between a successful and an unsuccessful operation. This ability to handle small instruments deftly is an all-important matter when every second counts, and the least bit of clumsiness may be disastrous.

An only son of a famous surgeon in New York had planned to follow in his father's footsteps since childhood. The thought of being a surgeon had been so automatic that he never had even considered any different career. He secured his premedical training with some distinction, but when he was faced with pursuing his studies toward surgery, he became panicky and flatly refused.

His father was furious. He thought this pure cowardice and stubbornness, and the whole family was upset. However the more they fussed and fumed with the boy, the more distant the solution seemed. The boy insisted he could not explain it; he only knew he could not go on with medicine.

The father mentioned their worry to a close friend one day. He said the boy was on the verge of a breakdown, and the quarreling and bickering at home was making life unbearable for all. But the boy would not give in. The friend suggested the aptitude tests, feeling something basic might be holding the boy back. The father scoffed at the idea, but eventually his son was tested. He had many aptitudes for surgery, but no tweezer dexterity whatsoever. He did have the aptitudes of a successful engineer. After still more emotional conflict the father relented, and the boy went to engineering school to become an outstanding engineer. In this case it is easy to see how a lack of

tweezer dexterity could make this boy instinctively unsure of himself in work that requires the utmost ease in handling small instruments.

The successful surgeon needs also analytical reasoning and low creative imagination: he must see the answer to complex anatomical problems almost instinctively and must not be diverted in his reasoning. Extreme subjectivity is essential for him to be truly happy in private practice. While in any work it is difficult to combine structural visualization with objective personality, in surgery it is almost impossible to arrive at a happy solution.

To illustrate, a few years ago four successful surgeons were tested in Chicago; all were unaccountably restless and bored with their work. Each tested with strong structural visualization, tweezer dexterity, and high English and medical vocabulary. But all were objective. Realizing that their objectivity caused the distress, they set about to readjust their work. One took a position as head of a medical school, but still was restless. Another became dean of a medical college, and he too, does not feel this is the answer. The third turned to managing a large hospital, but he is not satisfied. However the last teaches part time in a medical college and devotes the rest of his time to private practice. He believes he has come the closest to the solution of combining surgery with objective personality. The others miss the actual surgical problems, and while they are using their objectivity, their structural visualization and tweezer dexterity are not getting sufficient use.

The dentist needs high structural visualization for such reasons as understanding dental structure, how deep to drill, and in constructing dentures and inlays. Tweezer dexterity is important in using the drill and other dental instruments. He, too, needs to be subjective to be content working with in-

dividuals rather than with groups of people. And dentistry and surgery both lean heavily upon manipulative skills, which the human engineers have found are enjoyed more by an extremely subjective person than by an objective one, who may find it difficult to incorporate them into his day's work.

A dentist needs low creative imagination. This is illustrated by the experience of a Boston dentist who had built up a successful practice but came to be tested because he was dissatisfied. He thought perhaps he was in the wrong work entirely and should be in sales promotion or advertising. In spite of a large practice, he did not think he was a good dentist since he could not perfect techniques. He said he had watched other dentists, and their efficient techniques and their surety made him envious. He had tried hard but had decided he could not develop these essential techniques; he knew his work was suffering.

He tested as a dentist, but on the objective side and with very strong ideaphoria. The latter had been his downfall, for he bought every new gadget that came on the market. Furthermore, because his creative imagination and objectivity made him restless with private practice, and there was no outlet for his creative ability, he took it out in rearranging his office almost daily. Every day something would be in a different place; there would be new equipment to try out, and he would operate daily from different positions with different instruments. Small wonder he could not develop techniques, for to do that the same procedure must be repeated in the same way until it is perfected. Johnson O'Connor told him he was behaving like a creative housewife who, unless she has some other outlet, changes the furniture about constantly. The dentist saw the picture perfectly and laughed heartily at himself when he realized what he had been doing.

What to do about it was a problem. He had a solid back-

ground of dental knowledge, a high English vocabulary, but he needed more outlet for his objective nature and creative talent. So, like the diagnostician, he has opened a public clinic, maintaining a part of his private practice. His objectivity is used in dealing with groups, and his ideaphoria enters into group influencing and devising new ideas for the clinic. His techniques have improved since he stopped changing the furniture around.

The modern treatment of mental disease is a newer field than those just discussed. While the aptitudes for psychiatry have not been established as yet by actual measurement, the human engineers conjecture that a psychiatrist should have low structural visualization, at least lower than the general practitioner's, since he deals mainly with abstract concepts. He needs high creative imagination and inductive and analytical reasoning. Because he too works with the individual he should be extremely subjective. He should score high in English vocabulary and the vocabulary of medicine.

In treating mental disease the aptitudes recommended for occupational therapy have been established. This work tries to give the patient a mental outlet through constructive activity. The aptitudes needed are high creative imagination, average or above structural visualization, finger or tweezer dexterity. While either personality probably can be used, an objective personality would be desirable since many patients are consumed with emotional problems. This is a field that seems especially suited to women. One woman who had majored in zoology in college and then taken work in occupational therapy at graduate school, now directs the occupational therapy workshop in a large state hospital for the insane.

The nursing profession has always attracted young women. The nurse's job of carrying on where the doctor leaves off requires both competence and understanding. To get along well with the doctors and her patients, she needs a fairly high

vocabulary. In a study made of student nurses the human engineers found that those who score in the bottom 10 per cent in vocabulary never complete their nurses' training, and those who score in the upper 10 per cent leave the nursing profession. By way of aptitudes the nurse needs high tweezers dexterity, high accounting aptitude, average or low structural visualization, and low creative imagination. Accounting aptitude is extremely important to a nurse, for working under pressure she cannot afford to make mistakes in carrying out the doctor's instructions. Nurses who take up private duty need to be subjective, while those who aim for supervisory positions need objectivity. The visiting nurse making her round of calls to individuals, much as a doctor would, should be subjective.

There are many fields closely allied to medicine, which although not involving actual practice, perform a necessary adjunct to it. The person with a salesman's aptitude pattern and a high vocabulary of medicine should consider some phase of the public health field. Promoting public health and knowledge of modern medicine not only can help the world toward greater health and well-being, but it can help banish clinging superstitions, self-medication, and quackery that only serve to slow down the progress of medical science. The executive with a vocabulary of medicine can perform many executive and administrative jobs in public health. Raising funds for research, managing hospitals and hospitalization plans are only a few places where he can fit in and can be of real use. The role of public health inspector is becoming of greater importance as people become more educated and more health problems are uncovered. His primary aptitude is observation.

These are days of specialization for the doctor, dentist, and surgeon. We find many gravitating toward medical centers, where they can share their knowledge and skill with others equally skilled and where each can perfect his specialty. His

specialty must coincide with his interests and his aptitudes for the ultimate in success and personal satisfaction.

In these fields so directly concerned with our physical and mental well-being, knowledge assumes a vast importance. Here, indeed, a little knowledge can be a dangerous thing. Once the doctor, dentist, or surgeon has acquired enough knowledge to begin his practice, he cannot stop there. He must keep on growing or he will be left behind. He must keep abreast of the latest findings of research in his field and must know how to apply them. He must realize that the essence of life is change, and thus must keep an open mind for the changes in his own field.

The Lawyer

PERHAPS no other profession requires so much general knowledge as does law. In return, however, it offers practically unlimited opportunities for use. Law reaches the lives of all of us. Man's social advancement is the history of law; it is the means by which the individual is given maximum freedom without denying such freedom to others.

The basic aptitude pattern for the lawyer is extreme subjectivity coupled with high inductive reasoning and low structural visualization. However, because of the wide scope of law, practically any aptitude pattern can be utilized provided inductive reasoning is the dominant trait. Wide knowledge is essential, but fortunately the study of law itself is so comprehensive and exacting that it almost always results in a high vocabulary.

Why inductive reasoning is necessary to the lawyer is apparent. He must be quick to grasp the gist of things; he must be able to take scattered facts, bits of evidence, and principles of law and to correlate them instinctively. If we have high inductive reasoning, we see things quickly; with low inductive reasoning you might say it takes almost a blueprint to make us see it. Inductive reasoning is needed to cope with unforeseen happenings, and a lawyer often is faced with situations where he must rely on his instinctive reasoning to see the answer at once. While heretofore the human engineers have considered induc-

tive and analytical reasoning as two entirely separate traits, recent research and correlations have raised a doubt, and there is the possibility that the two aptitudes will prove to be one trait—reasoning.

Extremely subjective personality is desirable for the general lawyer because of the long hours of isolated study involved. Furthermore, in general practice he, like the doctor, works with the individual rather than with groups of people. But there are many opportunities for an objective person who has disciplined himself to acquire a sound legal background. He fits well into the legal aspects of business. And a thorough legal training offers an ideal background for entering politics, diplomacy, consular service, or any work of similar nature where such knowledge is desirable. Government is based on law, and now of all times needs objective lawyers who not only know their field, but whose natural bent is getting along with and working with all kinds of people. Many men with legal background have made lasting contributions to our own government. Outstanding, of course, is Abraham Lincoln.

The objective lawyer probably should not remain in private practice, but if he does, he should be alert to possible trouble, particularly should he rise high in his profession.

The profession itself is extremely subjective; the code of ethics is such, and the professional standards so high, that anyone who violates them may find himself in severe trouble. A prominent Middle Western judge is now serving a prison term because of this very thing. His offense, some of his fellow lawyers say, was one that could easily have been forgiven him in business, but in his professional world it could not. He is extremely objective with a large vocabulary and much inductive reasoning, but he tried to do in his profession what he would have done in business, and the result was imprisonment. The human engineers believe he should have left the profes-

sional world and used his extreme objectivity, legal ability, and knowledge in industry.

Most lawyers need low structural visualization, the absence of which means the presence of abstract visualization, for law itself requires an ability to think in abstract terms. The exception might be patent lawyers, who must have some structural ability to understand technical drawings and diagrams. A person with structural talent, legal training, and an interest in law should look into the legal aspects of some structural field such as building construction or city planning.

There is a situation encountered frequently by the human engineers. This is the desire of a successful lawyer to have his son study law and enter practice with him. While sometimes such a plan works out harmoniously, in many instances the son has none of his father's aptitudes for the profession. The father is disappointed, feeling his son lacks ability and ambition, and the son himself does not know what is the matter. Scarcely a week passes at the Laboratory but what such a son does not come to be tested because he is dissatisfied with law practice. Invariably these men score high in structural visualization, which they inherit from their mothers. However, if these men score highest in inductive reasoning, the human engineers do not recommend leaving the legal profession, but rather that they try to incorporate this aptitude into some phase of law.

The extremely subjective person with high inductive reasoning and high structural visualization is the problem solver. Outstanding advances have been made by applying the techniques of one field of knowledge to another. Today we have biochemistry, which is a combination of two fields—biology and chemistry. Likewise there is astrophysics, a combination of astronomy and physics. The atom bomb was evolved by teams from several fields of knowledge—physicists, chemists, engineers, and even statisticians. An intriguing problem would be

the combination of science with law. Who knows what discoveries may be made someday by a person with a scientific and legal background?

The Prohibition Amendment to the Constitution has been referred to as an experiment. It was a costly one. Could a scientist-lawyer by gathering facts, assembling his data, making a mathematical curve, and then projecting the curve into the future, have predicted the failure of the Prohibition Amendment? Also what is the scientific relation between the family and the divorce laws? Why do a hundred couples stay married, and another hundred get divorced? Would an alteration or perhaps a sweeping revision of divorce laws be more in conformance with the facts? The ascertaining of facts through observation or measurement and their utilization in predicting future behavior or action is what the scientists call "establishing a law."

Johnson O'Connor believes lawyers with high structural visualization may make outstanding contributions to law. As he says, "A person with high structural visualization and inspiring opportunities in law, who applies scientific methods to legal problems might carry jurisprudence to unimagined heights."

However, with high structural visualization, inductive reasoning is necessary to remain successfully in law. Not long ago we talked to a lawyer in Chicago who had scraped along for some years, barely managing to eke out a living. Following his graduation from an engineering school, he had shifted around to various law schools and had passed his bar examinations in a state where requirements were not so rigid. But he was not happy in law and said he had felt inferior and inadequate to others of his profession. He tested with low inductive reasoning, unusually strong structural visualization, creative imagination, extremely subjective personality, and a fairly high vocabulary. Ideally he should have been a designing engineer.

Fortunately the war gave him his break, for with this knowledge of himself he entered the service and secured work as a designing engineer. He found he loved it, worked hard at it, and is now back as a civilian working happily and successfully in a design-engineering job.

Either low or high creative imagination can be used in law. A judge probably should be low creative in order to exercise sound judgment. A high-creative person is inclined to have too many ideas, and it is the person with low creative ability who can take the ideas of others and sift out those that will work. The lawyer who does have ideaphoria can use it to advantage in writing speeches, articles, and preparing his cases.

Any lawyer knows the importance to him of being able to express himself fluently and well, to say exactly what he intends to say. This, of course, means he must have a wide vocabulary. But in addition to vocabulary, he should be able to talk forcefully and interestingly in presenting a convincing case, which means he should excel as a public speaker. One of the saddest stories we know, pathetic in that it might have been avoided, is the case of a moderately successful Boston lawyer who was tested at the age of fifty-seven. He scored as a perfect lawyer with an extensive vocabulary. He was a man of rare charm and personality, but he stammered badly.

In taking the tests he proved to be left-eyed and right-handed. The human engineers told him that they were certain this cross dominance was responsible for his speech difficulty, that if he would work gradually to make himself left-handed, he very probably could cure his stammering. The man did nothing about it until he was sixty and had retired from law practice. Then he began the process of making himself left-handed. It took him three years, and he came back to the Laboratory amazed, to report his stammering was cured. Imagine the difference it would have made to him if this handicap had

been overcome in his younger years. One can only surmise the heights to which such a talented man might have risen in law if he had not been forced to labor under a severe handicap in a profession that so often demands the ability to be a forceful and persuasive speaker.

Aside from the need of a wide and growing vocabulary in order to rise in his profession, there is a matter of first importance to the lawyer entering practice. This is passing state bar examinations. All states vary in their requirements and in some the requirements are so rigid that an extremely high vocabulary is essential to pass them. A number of years ago the Laboratory tested a man who scored as an ideal lawyer, who had completed his legal training, but had failed twice to pass his state bar examinations. He was despondent over it and felt he never would be able to practice law. He took the tests to find out whether he might be "barking up the wrong tree" and to see what might be the alternative. He wanted to be a lawyer but was so discouraged by being turned down twice that he could see little hope.

It so happened he was trying for bar admittance in a state where requirements are very rigid. His vocabulary was not up to that level. It was suggested he study the requirements of the various states, then select the one which exacted the least and try to pass the examination in that state. He did this, was admitted to the bar, and set up his practice there. He remained for three years, meanwhile working hard to build his vocabulary. Then he came back to his original state, passed his examination, and was admitted to the bar. He is now a successful lawyer.

The exact meanings of words is essential to the lawyer, for his work depends on exact meanings. While those of us outside the field of law may scoff at legal terms and phrases that we read in our leases, contracts, insurance policies, and the like,

and may think that if they were written in plain language, we could understand them, yet there is reason behind such phraseology. Through long usage certain legal terms and phrases have acquired an exact meaning about which there can be no misinterpretation, which is why they continue to be used.

Since inductive reasoning is the aptitude of the professions, the human engineers advise anyone who scores highest in inductive reasoning to continue formal education as long as possible. But occasionally a case comes up where it is impossible for a person with a lawyer's aptitudes to secure his legal training. What then? A heartening story is that of a man who came to the New York Laboratory a few years ago to bring his sister to be tested. He said he had been tested ten years previously while in college and had been advised to go through law school. But, he added, he did not become a lawyer; he was now a successful business executive.

What had happened was this. He had left the Laboratory full of high hopes and dreams of someday becoming a successful lawyer. Then circumstances at home intervened, and he found himself confronted with the immediate need of supporting the family. He gave up the idea of law and went into business, where he became a successful executive. This, with his aptitudes of extreme subjectivity and high inductive reasoning, goes contrary to the successful executive pattern of objectivity and low inductive reasoning. But he attributed his success to never having lost sight of the fact that basically he had the qualities of a lawyer, and to always having gone into every executive meeting as well prepared as if he were presenting a court case. He had studied business with a legal thoroughness.

While law at one time was considered man's province, more and more women are gravitating toward it. There is no reason

why many women should not become outstanding lawyers. Actually, as a group, they score higher than men in inductive reasoning. There are so many problems of a legal nature that affect the home, children, domestic relations, etc., that could be handled admirably and understandingly by women. Politics, too, is offering a growing place for women. There is little doubt that an objective woman with wide knowledge could do great good in bringing a woman's point of view into government. A successful family is the work of both a man and a woman, so why shouldn't the relationship be extended to the larger "world family"? While legal training is not essential to a man or woman entering politics, certainly such training makes them that much more useful.

But those who enter work that affects all people must have a wide knowledge, a breadth of vision, and an earnest objective toward which they are working. Probably to be able to work toward an ultimate goal and stay with it, we need the aptitude of intellectual vision. The person low in this aptitude usually is interested only in the immediate situation, and he does not seem to be able to look ahead or beyond.

As an example of what low intellectual vision can do to its possessor, sometime ago the Philadelphia Laboratory tested a college student who scored as a lawyer but with low intellectual vision. He had planned on becoming a lawyer, but when summer vacation came, he secured a job as a waiter in a fashionable resort. When he found he could earn as much as \$150 a week, he decided to quit school, and he has been working for some years now as a waiter. Although he is financially able to go back to school and has the aptitudes to become a successful lawyer, he is perfectly satisfied to be a waiter just as long as it earns him a good salary at the moment. He does not look ahead. But the lawyer who goes into government or other public work

usually needs to be able to hold to an ultimate goal, for his day-to-day work may show little or no advancement, and he must be able to take the long-range point of view.

Society rolls forward with the lubricant of the law. Lawlessness is a synonym for terror and chaos; disorder and malfunctioning of the social organization are a challenge to the lawyer. The lawyer may not only interpret social change, but may anticipate it. Lawyers could be the architects of the world of tomorrow.

The Teaching Profession

WHILE the theory of education has advanced little since Plato, certainly its availability has broadened, giving more and more people a chance to learn. The fundamentals of education—reading, writing, and arithmetic—have opened up avenues of learning, so that those with ability and the will to study may travel as far as they choose. Many may be able to grasp these fundamentals, but need inspiration and the desire to learn more. These may be instilled in us by our teachers. A teacher exerts an influence that is pervasive and far reaching, and a poor teacher can so discourage and dispirit students that it may take years to overcome the damage done, with many never inspired to seek further knowledge.

Just what makes a good teacher? Aside from our *wanting* to teach, the human engineers believe certain qualities are necessary. They tell us that to achieve the greatest success and satisfaction from teaching, we should possess creative imagination, and inductive and analytical reasoning. In addition, the teacher's general aptitude pattern includes accounting aptitude, low structural visualization, and low observation. From the Laboratory's research, it is known that 58 per cent of teachers grade A in creative imagination, while only 2 per cent grade D. Forty-two per cent grade A in inductive reasoning and 18 per cent grade D. In analytical reasoning 88 per cent grade either A or B, while 12 per cent grade C or D.

In teaching, the basic problem is to explain new thoughts in

terms of what the pupil already understands. This requires two things: [creative imagination to think of a wide variety of approaches, and inductive reasoning to discard those approaches not applicable to the student's present knowledge] The successful teacher's dominant trait is creative imagination. It is this inherent constant flow of ideas that gives the variety of approaches he needs. A teacher who lacks creative imagination usually leads a dull class and is at a loss to find new ways to reach his pupils. Thus he often fails as a teacher, by not providing inspiration, stimulation, and new ideas.]

[But creative imagination by itself is not enough. In any work strong creative imagination must have another aptitude guiding it, or it runs wild. To be used constructively in teaching, creative imagination needs inductive reasoning to control it. The teacher with strong creative imagination and no inductive reasoning is inclined to be abnormally restless. He experiences a persistent desire for change, often shifting from one school to another. He has difficulty in making his pupils understand and becomes "impatient" with those not quick to grasp what he is teaching. It is inductive reasoning that enables a teacher to link the new with what a child already knows! After all, that is the best way to learn; gradual accumulation of knowledge must be built up with nexuses of understanding.]

In teaching, as in any other work, uncontrolled ideaphoria goes off on meaningless, restless tangents. As an example, there is a teacher in her early forties who for some time has been a problem to herself, and to the human engineers, too, for they cannot make her see her unusual possibilities. She is attractive, has a fine educational background, but has led a life of restless, vaguely unhappy roaming all over the world. She never has had a good job, and her teaching positions never have been on a level with her capabilities. She has been divorced, has had two

nervous breakdowns, and currently is suffering from stomach ulcers.

Her trouble is clearly defined from the standpoint of aptitudes. She scores A-plus in creative imagination, but has no inductive or analytical reasoning. As a result the quick, alert, and easy-to-teach children are the ones she concentrates on, regarding the others as stupid and beyond hope, for she lacks the inductive reasoning to grasp what they already know in order to make them see what she is trying to teach. Thus she probably does more harm than good. She is extremely objective with a vocabulary on a level with top executives; she has low structural visualization and fairly high accounting aptitude, and is left-eyed and right-handed. Undoubtedly cross dominance coupled with an uncontrolled creative imagination have contributed to her abnormal restlessness and her nervous problems.

She behaves subjectively and for years sought out only the most isolated types of jobs before she began teaching. Meeting her for the first time one would gain the impression that she is extremely subjective with a low vocabulary—the exact opposite from what she actually is. The human engineers believe she should first of all try to make herself left-handed, to relieve a long-built-up inner tension. Then, because she lacks the controlling inductive reasoning for teaching, she should work her way out of teaching into selling in some high-vocabulary field, where her extreme objectivity controls her creative imagination. She has the perfect sales-aptitude pattern, but she scorns selling, using her high vocabulary to rationalize her behavior. Paradoxically, she seeks out low-vocabulary people for her close companions. Often her imagination expresses itself in startling eccentricities in clothes, in flagrant poor taste for a woman of background. These expressions of individuality might be condoned if she had sound work behind her, but her

real accomplishments are nil. The sad part is that she has rare possibilities to create an interesting and useful life for herself if only her "atomic energy" could be unlocked. She has a rare combination of extreme objectivity with high vocabulary, and has potentialities of becoming an outstanding woman. But she is so obfuscated with cross dominance aggravated by uncontrolled creative imagination that no one is able to reach her, and she probably never will do a thing.

While the human engineers list accounting aptitude in a teacher's aptitude pattern, the lack of it need not deter one from teaching, although its possession does make grading papers and other paper work less strenuous. Why teachers score low in observation, the human engineers do not know. However, it is known that a teacher working with children should be objective. Objectivity combined with the other aptitudes for teaching constitutes the so-called "group-influencing pattern"—and there is no doubt that teachers need to be effective influencers. Perhaps the subjective teacher belongs in college teaching, where he gets more opportunity to work with the individual pupil, and where his specialized knowledge, writings, and lectures add to his success.

Most teachers score low in structural visualization, especially teachers of English, history, and the languages. However, teachers of science and mathematics need structural visualization as their next highest aptitude after creative imagination, inductive and analytical reasoning. These latter aptitudes must come first or the result may be ineffectual teaching or complete failure.

To illustrate, a young man tested recently in Philadelphia had been released from his teaching position in a boys' school after three unsuccessful years. With the present shortage of teachers his work must have been unusually inferior to be asked to leave at this time. Naturally he was despondent for he could

not determine the cause. There was nothing of a moral character to merit his dismissal; it was only that he was a poor teacher. He had been graduated from a teachers' training school, for his family had insisted he was a "born teacher" because he got along so well with the children of their acquaintance. However, at school the boys had worried and irritated him.

After being released from the school he took a bookkeeping position, but this left him even more discontented. When tested he scored very high in structural visualization, with high inductive and analytical reasoning and accounting aptitude, and low creative imagination. While he lacked the ideaphoria needed for teaching, he probably failed also because of the dominant structural visualization that he never had used. It was higher than his accounting aptitude, which was why the book-keeping job did not satisfy him. He scored extremely subjective, and probably had been drawn into teaching because of a vague desire common to many extremely subjective people to be in work directly affecting humanity. But the human engineers caution us if structural visualization is our strongest trait, and we score next highest in a teacher's aptitudes, we should not be misled into teaching, but rather should be in some branch of engineering or the sciences, where as much good can be done to help the world.

When we look at it squarely, isn't the true purpose of education to direct ourselves toward the fullest development? Education should be a training for living, not a mere accumulation of unrelated facts, dates, and numbers that are soon forgotten. The broader our scope of education with real meaning behind it, the better prepared we are to get along in life. The teacher who can convey the real need for a wide general knowledge of this world and the people in it performs an invaluable service to his pupils. To do this a teacher should possess wide knowledge; he should have a high vocabulary. He must

have a broad viewpoint of life to sift out what is important to teach from the masses of accumulated facts. Also, he needs high vocabulary to understand different types of students and to deal accordingly with their special problems.

College professors score higher on the vocabulary scale than preparatory and high school teachers, while elementary teachers score lowest. Among elementary school teachers especially, there is a tendency to attempt to bring their own vocabulary level down to that of their pupils. The Laboratory believes this is a mistake. It does not work. Even when they talk down to their pupils unconsciously the children resent it. But worst of all is that they lower their own thought processes to the point where they cannot adequately answer a child's questions.

While we are fortunate in having many high-vocabulary teachers who view their work in the light of its worth rather than for the money involved, there is no doubt but that increased salaries for teachers would attract more high-vocabulary people into the profession. The human engineers have tested thousands of teachers, some who belong in teaching, and many who do not. They have tested others who are not teaching, but who should, rejecting it because of the salary problem.

Every once in a while a person with an ideal teaching pattern, and who is a successful teacher, takes the tests because he is positive he is in the wrong work and should be in something totally different. A teacher tested not long ago at the Chicago Laboratory burst into tears when she found she scored as a teacher. After she had finished her cry, she told the test administrator that she had been teaching steadily for ten years and was sick of it. She did not think she could ever grade another paper or look at another child.

In going over her bar graph of aptitude scores with the test administrator, her possibilities were narrowed down to two

fields, politics and teaching. Politics held no interest for her. She did test with low accounting aptitude, which explained her revulsion for paper work, but—more important—she had not taken a vacation in ten years. Each summer she had taught at summer school. She had ideal aptitudes for a teacher, and it was suggested she take a vacation as far removed from teaching as possible, then come back and see how she felt about it. She went away for three months, and came back to teaching with fresh enthusiasm and a new outlook on her work.

The human engineers believe more of us need to realize this in connection with our work. Many persons come to be tested in the hope that the Laboratory can suggest some perfect position where they can work tirelessly with zest and zeal. Any job has its drawbacks and limitations, and no matter how well fitted we are to our work so far as aptitudes are concerned, any of us reach the point at times when we get sick of our work and feel perhaps something totally different would be the right thing for us. Most of us get so close to our work at times that we cannot see the forest for the trees, so we get bogged down with details and unessentials. We lose perspective of what we really are trying to accomplish, and minor irritations assume undue importance. If our work is right for our aptitudes and we feel confused and dispirited, it may mean only that we need a change. Change gives us a fresh viewpoint and enables us to think rationally about ourselves and our work. In fact, the human engineers believe all of us should take vacations of an opposite nature from our work; they recommend that objective people take subjective vacations and vice versa.

Teaching offers women a practical way of combining marriage and outside work. While there is much controversy about marriage versus careers, why there should be a dividing line seems absurd, for development along the line of our aptitudes, whether we are men or women, is essential in gaining the

most satisfaction from life. There is no reason why women cannot marry, raise a family, and maintain a happy and interesting home life with useful and stimulating work of their own creation. The woman teacher who marries and raises a family can study, keep abreast of educational trends, and at times serve as a substitute teacher. Later on, when her children are old enough, she can go back to full-time teaching. Many such mature women who have raised families of their own, who have emotional balance, and who have kept up knowledge and interest make exceptionally fine and understanding teachers.

Whatever we teach should be coincidental with our aptitudes. That is, an art teacher naturally needs to be dominant in art talent; a music teacher in musical ability. In industry instructors in the sound field need tonal memory, and, of course, in the structural fields structural visualization is imperative. When the Laboratory does industrial testing, it recommends that objective people with the teaching pattern be placed in jobs where they instruct others. Salesmen and teachers have almost a similar aptitude pattern. The primary difference is that salesmen are more objective and have low inductive reasoning, but industrial instruction does not exact so much in the way of inductive reasoning as does academic teaching. If salesmen would recognize this and would learn some specialty, they might have a job alternative for those times when selling is at a low ebb.

The ideal teacher has also the aptitudes of a writer. It is true that a deeply creative writer must be extremely subjective, but the less introspective types of writing can be done by the objective. High-vocabulary teachers of broad experience undoubtedly have many ideas based on knowledge and practical experience that could improve education if these ideas were published for others to read. While writing itself serves to clarify thinking, which is valuable to the teacher, it is also one

way to call attention to problems that need solution. There are so many aspects to the entire field of education that any high-vocabulary teacher who wants to write certainly should not be at a loss for want of material. Surely there is much to be done in the way of writing new textbooks. For instance, in both history and geography the present trend is to emphasize the likenesses of people as against the differences stressed too often in the past. This could be a vital force in bringing about an understanding of the peoples of the world.

But education is a broad term, and in writing about it we need to select some specialized field in which we can become authorities. Whatever we do choose to write about, we need a deep personal interest in our subject and an abiding belief in its usefulness, or our work lacks depth, meaning, and certainly offers nothing in the way of self-expression.

A year or so ago a teacher of about thirty-five was tested in Tulsa. She was a graduate of a leading women's college and had her master's degree in education. She taught successfully in a fashionable finishing school but quit after she was married. She now has a boy of five and for some time has felt an urge to go on with the development of her own life. She does not want to go back to teaching, for she feels her child needs her at home. He has severe myopia, and the problem of educating him and giving him a good start in life with such a handicap is of deep concern to her.

She scores as a teacher, which means she also has the aptitudes of a writer. She had excellent training and experience in education, and has decided to make writing on educational problems her life's work. To her the study of the visually handicapped child is all important. For her own information she wants to learn all she can on the subject in order to guide her son's education. So she has chosen this and hopes through study, observation, and writing to make contributions to the

study of the visually handicapped child, and thus help others with the same problem.

In the light of our present knowledge think of all that could and should be done in education. Because our frontier today lies on the border of human knowledge rather than in unexplored lands, education assumes greater proportions. With education comes understanding. Once the veil of ignorance is lifted people begin to lose their fears. With the loss of fear we approach the solution of our man-made troubles.

The Entertainment Field

ALL through history the drama, music, dancing, and allied expressions of individual creative talent have revealed the culture of the times. Mediums for these expressions are steadily growing, and today the entertainment field offers many opportunities for performers and those who support them to find self-expressive work. In the past, professional entertainment was enjoyed largely by a privileged few, but today the radio, motion pictures, and theater bring these expressions of a country's culture into our homes and local communities, while easier travel gives many the chance to enjoy the best that the entertainment field has to offer.

To most of us performances by real artists are thrilling experiences. Their interpretations of people and of life's many aspects serve to broaden our own concept of people and the world, and often they express to us what we feel deeply within ourselves but lack the talent of expressing. They may make us want to laugh or cry, to forget or minimize our own problems, or they prompt us to be more conscious of the problems of others, or they inspire us with deeper feelings of true beauty and of human life. Thus this field as a cultural, educational, and unifying force has developed into a highly important part of our lives.

As any performer who has reached the top in the entertainment field knows full well, there is no short cut to success. Because of the prevalence and influence of the movies, there

are many stage-struck young people who flock to Hollywood with a conviction that face and figure are all they need to become great stars. Perhaps some get a chance if they show talent, but for those who make the grade it is invariably a long, slow climb, with unceasing practice to perfect skill in a specialty. While laying this groundwork is a long, tedious, and often discouraging process, aptitudes and knowledge are of equal importance to the performer.

(The general aptitude pattern for acting is extremely subjective, creative imagination, low structural visualization, and for real success, a high vocabulary. Without exception, outstanding performers of any kind are extremely subjective. They are the real individualists who go their own way, who do things the way they want to do them—which may be a reason why so many good stories are told about them. Subjective types with wide knowledge and a developed skill invariably are interesting persons.)

It is easy to see why subjectivity is essential to the successful performer. In the first place, the emphasis is on calling attention to himself, which in itself would need the subjective's natural tendency to dramatize himself in a situation. But important, too, is that so much solitary practice is necessary to become successful that an objective person rarely can do it.

To give original touches to a performance and to be able to imagine yourself as someone else needs strong creative imagination. Low structural visualization is necessary for abstract thinking, and high vocabulary is essential to give fullness, depth, and understanding to a performance. Accompanying these traits must be a deep interest and feeling for the theater.

Vocabulary is of first importance to the really successful actor or actress, and it is true that those who reach the heights in the entertainment field, and whose stardom never wanes, are high vocabulary. In testing many successful people in this field

the human engineers have been amazed at the broad knowledge they possess, for they score exceptionally high in vocabulary. It may be true that some younger people get by for a time on brilliant aptitudes and stubborn work, but unless they grow in knowledge, eventually they slide into obscurity. It would be natural to think that those stars who act the perfect fool on the stage, radio, or in the movies, who may in their performances murder the English language and in many ways give the impression of being decidedly low vocabulary, could not possibly be high. But they are. In their performances they are only giving us what we want from them, and they are astute enough to see it and to look ahead to future trends.

A striking example of the importance of vocabulary in the entertainment field is the story of two men tested recently in New York. By coincidence they both happened to be tested in the same week, and both had exactly the same aptitudes. They were extremely subjective with high ideaphoria, low structural visualization, and with strong musical and art talent. They were about the same age, and both professed a primary interest in musical theatricals. One scored at the ninetieth percentile in vocabulary and the other in the bottom 5 per cent. It turned out that the man with high vocabulary was currently starring in a successful Broadway musical comedy, but the man with low vocabulary was a clerk in a cigar store.

The player must have a supporting organization. To begin with, there must be a good play. A playwright needs the aptitudes of subjectivity, ideaphoria, inductive and analytical reasoning, low structural visualization, and a high vocabulary. Nowadays the settings and costumes in a play contribute much; stage and costume designers need subjectivity, creative imagination, structural visualization, art talent, and hand dexterity. The director of the play is the group-influencer with objectivity, high creative imagination, inductive and analytical

reasoning, with perhaps both art and musical talent. On the other hand, the producer is the straight executive with objective personality, high or average accounting aptitude, low creative imagination, and high vocabulary. With his set of aptitudes he can manage the affairs of his highly creative group and can hold on securely to the financial and more practical ends of the theatrical reins.

Often an extremely subjective person who is high in all measurable aptitudes is drawn to the theater, particularly to acting. But acting alone seldom offers enough outlet for such a person. Anyone with too many aptitudes has a difficult problem, for at first things come too easily because of high aptitudes, and also because there are so many fields in which he could be successful. Unless he builds knowledge and develops work far beyond the scope of any standard job, he may never amount to a thing. Whether he is objective or subjective the entertainment field does offer possibilities to the too-many-aptitude person. The all-aptitude, extremely subjective person, because he does have structural visualization, art talent, ideaphoria, and all the rest, probably can utilize many of his talents in stage and costume design, combined perhaps with writing or acting. One woman, high in everything but observation, and with a top vocabulary, had tried acting but with little success. As her interest lay in the theater, she stayed on with it but has turned to stage design and playwriting, and with remarkable success. A man who had been teaching quite unhappily for some years, with a similar aptitude pattern, has done the same thing.

An extremely objective woman with high vocabulary and many aptitudes writes that she has worked out a unique solution to the problem of using her abundance of aptitudes and is happier than she ever has been. She had tried teaching, writing, occupational therapy, art, music, but each practiced singly left

her restless and bored. She now writes, makes, presents, and sells marionette and Chinese shadow plays with great success. She uses her high creative imagination and inductive reasoning to write the plays; her structural visualization, ideaphoria, art talent, and hand dexterity are used in making her marionettes and in creating her own stage settings. Her musical talent enters into the music that accompanies her performances; her hand dexterity helps her in manipulating the marionettes, while her objectivity enables her to sell her show and to get on famously with the children in her audiences.

If sound or music enter into your work in the entertainment field, the musical aptitudes of tonal memory and pitch discrimination are imperative. The musical performer needs also the basic requirements of extreme subjectivity, creative imagination, low structural visualization, and wide musical and general knowledge. Music is such a basic form of self-expression that many with inborn musical talent start out in life with high hopes of finding the ultimate in self-expression as great concert performers. Many may be called, but few are chosen. They may be extremely subjective, may be deeply sensitive to the basic feelings they long to express, may possess strong creative imagination, musical talent and knowledge, with wide general vocabularies, but in spite of years of hard work they never achieve success. The human engineers have found in testing such people that they have chosen the wrong medium of expression, for there are other aptitudes that have strong bearing on our success in musical performance. These are accounting aptitude and finger dexterity.

A great many people start music with the piano. The piano demands finger dexterity and a high degree of accounting aptitude. Any musical instrument with scores written in more than one clef requires accounting aptitude in order to read music rapidly enough to keep up with both hands. Instruments

in one clef, such as the violin, require little accounting aptitude but do demand finger dexterity and much pitch discrimination. These may seem petty matters, but to some people they have spelled the difference between success and failure.

Music is an ideal hobby, but even in pursuing it as such we should consider which form, from an aptitude viewpoint, would give us the greatest success and satisfaction. Tonal memory is of first importance for anyone who takes up the study of music. From the Laboratory's research in this test, if you make eighteen or more errors in it, the chances are strong you would not voluntarily choose to study music. The average person who starts out in music and drops it in a year makes about fifteen errors in the test. But not unless you score with eight or less errors can you expect to continue the study of music for more than ten years.

The objective person who has the rest of the pattern of the musical performer stands a good chance of finding expression through composing. The human engineers recently tested a composer who brought forth some interesting speculations from his own experience about aptitudes and composing. He tested contrary to the Laboratory's conception of a composer in that he was extremely objective with very high structural visualization and low finger dexterity. He scored high in creative imagination, memory for design, accounting aptitude, muscular speed, musical talent, and knowledge. He believes he does better work because of a conflict of aptitudes; that if he were less objective, for instance, he would almost drool with music, whereas with extreme objectivity it is just that much harder for him to compose, and he does a better job. He thinks memory for design enters into seeing scores, that high structure is needed for attaining musical volume. And he believes muscular speed is more important than finger dexterity in playing the piano.

Although these are new ideas to the human engineers, further research will weigh the truth in his speculations. As to the conflict of aptitudes, they believe this often may be true. They believe, too, we should raise the standards of our goal high enough above our highest aptitudes so there is a constant struggle. If we concentrate on a low aptitude, we do not have to work so hard to be above average; but with high aptitudes it is that much more work to fully utilize them.

Our history is filled with stories of composers who have "starved in a garret" for the sake of their work. What is wrong in our civilization that many of the basic forms of self-expression, which add so much to our lives, should so often exact poverty and privation on the part of possessors of talent in order to achieve their goals? Or is facing grim realities part of the process of uncovering real art? Once these people achieve success, the rest of us are eager to almost worship them, yet as a group we are not willing to give them help when they need it most.

But if the garret-starving must be done, it is more likely to be done by men than women. Women tend to be more practical, and while men will really suffer for their art, few women will. One woman with great possibilities for successful composing, and who says she wants to be a composer more than anything else, is afraid to try. Instead she clings to the thin thread of financial security that a secretarial job affords. She has a solid background of musical theory, scores 100 per cent in musical knowledge, but is afraid to even try composing for fear she will want to give all her time to it and will make no money at it for some time. She lacks the courage and ambition to try to do it in spare time and is actually afraid to use her aptitudes—a not uncommon thing, incidentally. Yet she is miserable, for it is the use of her strong composing aptitudes that would unlock her creative forces. She dreams of becom-

ing a composer, wishes wistfully for some improbable "break," yet lets valuable time slip by without doing anything about it.

Many people score high in tonal memory, yet never give it a thought in connection with their work. This is especially true among objective people who are too gregarious to become successful performers and who think of music in terms of a musical career only. Yet it might be safe to say that any objective person with strong musical talent can find some place to fit into any field that utilizes sound or music. Radio offers possibilities; so do the movies. And the human engineers believe that, for some reason as yet unknown, photography involves high tonal memory.

An example of how this works out in radio, if one has the necessary aptitudes and ambition, is seen in the story of a young man whose rise in radio has been almost meteoric. At the onset of his career he had an obstacle of no small size to overcome in severe opposition from his father, who wanted his son to be an engineer like himself and to enter his firm with him. Even as a boy the young man had composed popular songs, receiving no encouragement whatsoever at home. When he would send his compositions to publishers, and they would bounce back with the usual rejection slips, his father would respond with a triumphant "I told you so!"

When he was tested a number of years ago in Boston, he was just out of high school, and his family were preparing to send him to engineering college. He did not want to be an engineer, and when he found from the tests that he lacked the aptitudes of an engineer but had ideal talents for radio, he left home to go on his own, securing a minor job in a large broadcasting company. He had tested with extremely high musical talent, strong creative imagination, low structural visualization, average accounting aptitude, low inductive reasoning and objective personality. With this knowledge of himself, he was on

the alert constantly for an opportunity to show what he could do.

Working around the studio he managed to secure the interest of several well-known singers who liked him and his music. They saw he had talent and helped him to get started. Some of his songs were published and began to sell well. Then he was hired to write the musical numbers for two motion pictures. He writes that he has worked up to an important director's position on the radio network, writing and directing musical shows. His father is proud of him now, but think what a mediocre and unhappy engineer he undoubtedly would have been if he had not had the courage and confidence in himself to go the way of his talents.

The entertainment and artistic fields are outstanding in that men, particularly, must often buck the opposition of their fathers, especially those successful in the business world, who want their sons to follow them, and who think work in the creative arts is only for less vigorous males or even the queer and maladjusted. Nothing could be farther from the truth.

A case that has disturbed the Laboratory staff for some time is that of the son of a well-known manufacturer who brought up his only son to inherit and control the business. The human engineers came across the story while testing a group of executives in the plant. The son holds an executive title of some kind, but he loathes the business. He scores as an ideal stage designer, and ever since he can remember, his interests have always been in the theater. But his father would have none of it. He always has brushed it off as a romantic phase that the son would pass through eventually; then he would come to his senses and settle down into a solid and responsible company president. The son is now in his early thirties, with a growing dislike for the plant.

Some men in the company told the test administrator it was

a shame that the son never had been allowed to go his own way. He now has a wife and two children to support, and the father has threatened to cut him off without a cent if he leaves the business. All his experience has been there, and he does not know where else to turn. But he is never in the factory. When he is needed, someone must send home for him and invariably they find him and his wife busy at work on a book about the stage. The plant, of course, is suffering from his lack of interest and inefficiency and he is keeping some well-qualified man from a good position. But worst of all, it is making this talented man, with potentialities to make real contributions to stage design, into a morose and unhappy person. Yet the father is too stubborn to give in and to help him lead the life he should.

No one will deny that there is room for improvement in the entertainment field. Too many people are influenced by the radio and movies, particularly, for us to ignore their importance. Whether that influence is good or bad depends on the people in those fields, for tremendous power lies in their hands. At the present time, far too many movies and radio programs are standardized, and ground out on formulas. They are set in a dream world that lacks depth, reality, and feeling. In contrast there is much comment today on the unique movies coming from England. Could it be that the war itself brought the English people face to face with reality, that they learned to think and to feel more deeply, and this in turn is reflected in their plays and in their acting?

The Artist

ARTISTS are social historians, for they present a visual interpretation of the ideals and tastes of their times. The real artist gives us more than a technically perfect interpretation of his subject, for he attaches to it a deep perception of life as he sees it. The great artist conveys this to us in a way so basic that his work, besides possessing technical skill, has a fundamental quality that causes it to live. We rarely tire of great works of art, for they have a spiritual value that answers a need within us—a spiritual value reflected in the decorum and quiet of a great gallery.

While many of us have some of the talents and knowledge of the artist, few of us have the genius of the great. His deep sensibilities and close attunement to the pulse of life are not given to many. He also has courage to go his own way, to dare to be original, to avoid imitating the successful. Perhaps some potentially great artists are held back by lack of self-reliance, for how many of us think that because ideas are our own they may be inferior to those of others? Thus, too often we copy the successful rather than dare to express ourselves in our own way.

The human engineers believe every extremely subjective person with strong creative imagination should seek some aesthetic form of expression. If high in inductive reasoning, he should write; if strong in structural visualization, he should try sculpture; if low in both inductive reasoning and structural

visualization, he should try painting. And if he possesses in addition certain or all of the known art talents, he should attempt to incorporate them in some way as part of his life's work, rather than indulge in them only as a pastime.

The original artist is extremely subjective with high creative imagination; he must work alone and with a wellspring of ideas. As far as the Laboratory now knows, he needs also the aptitudes of memory for design and discrimination of both length and color. He may need proportion appraisal, and established artists all score high in knowledge of paintings and in vocabulary of art.

While proportion appraisal has long been listed by the human engineers as an art aptitude, continued research raises a doubt. That it is an aptitude is certain, and the test itself is reliable. But its actual role in life has not been determined satisfactorily. About fifteen years ago the research which developed this aptitude began by using the Dr. Margaret McAdory art test to determine art ability. As the aptitude test was administered originally, it was true artists did score high in it, but when the human engineers had tested enough miscellaneous people, they found it was not discriminatory. Too many laymen in fields far removed from art scored high in it, too. Through the years the test was gradually simplified until it developed into what is now known as "proportion appraisal." Engineers, mechanics, and scientists all score high, yet the aptitude does not correlate with structural visualization. Advertisers, who score low in structural visualization, score high in proportion appraisal. Salesmen get twice as many D's as A's in it, yet the explanation here might be that salesmen in general are not interested in concrete things, but people with high proportion appraisal are. Lawyers score low. Architects, of all people, score low in it, yet those in architectural sculpture score high. That is all that is known about it at present, and

further research is needed to find where the aptitude plays its most important part. Not all artists score high in it, yet those successful in some form of art design appear to possess the aptitude to a high degree.

Most people in purely creative art who shun commercialization of their art face a real problem in earning a living in fine arts until they become recognized—if they ever are. But unless they have independent means of support, often they must resort to what they consider “goldbricking” in order to earn a living. Commercial design, advertising art, illustration of books, magazines, and magazine covers are but a few lucrative mediums open to those with talents, skill, and knowledge, but which often can be done independently and need interfere little with the pursuit of real art. Others, anxious to remain in fine arts only, work in galleries or teach. The theater, too, offers growing opportunities for the artistically gifted person. Stage and costume designers are extremely subjective with high structural visualization, strong creative imagination, proportion appraisal and memory for design, and they score high in vocabulary of architecture, vocabulary of art, and knowledge of paintings.

Still others, with inductive reasoning also, write on art subjects. The successful art critic, capable of passing an opinion on the work of others, scores exceptionally high in knowledge of paintings, with extreme subjectivity, high inductive reasoning, average creative imagination, low structural visualization, and low accounting aptitude.

One artist who has refused to lower his standards in painting, and who for some years has been reaching for depth and perfected skill, teaches art part time in college, and recently has written a book on art that was widely received. But the artist who clings to the fine arts rarely has an easy row to hoe, for often it takes years to find himself, to express what he really

feels, and to perfect the skill and originality he is trying to achieve. And when he does, much depends upon whether or not the times are ready for him.

There is more opportunity now than ever before for any person with limited art talent, or even for those who only possess art knowledge, to exercise it commercially. Consider industrial design alone. Today, manufacturers realize they must please the eye as well as provide a useful and technically sound product. This may carry through all the way from the design of a bottle or package to washing machines, refrigerators, and automobiles. The field is enormous and applies to practically any product. Proportion appraisal seems to enter into this type of design, and the human engineers recommend that anyone who possesses it to a strong degree, and who is working in an industrial organization, be on the lookout for products within the company that might have their appearance improved.

But the person working in industrial art often has difficulty in conforming to business routine. This is particularly true if he is equipped with sufficient creative imagination to give the manufacturers the originality they want. The high-creative person rebels at restriction; he is inclined to work spasmodically, and for days may appear to do nothing. The high-creative, subjective artist, if trammelled by a business routine and put under pressure to create, cannot do his best work, for he must work at his own speed.

A complaint made by many manufacturers of textiles and wallpaper, for instance, is that they do not get the original designs they want from their own design departments, and frequently are obliged to buy designs from the outside. If designs must be plotted carefully on graph paper, with other routine restrictions enforced, it stands to reason that the highly creative person will be unhappy doing it. Either he hangs on doing a mediocre job or he gets out. Those who remain happy in a de-

sign department may be those high in accounting aptitude or tweezier dexterity, with lesser creative imagination, who thoroughly enjoy working with figures and symbols, or who get satisfaction from handling their drawing instruments.

In Boston the human engineers recently tested a successful commercial artist long employed by an advertising agency. He had just quit his job. He said he could no longer bear the pressure put upon him; he felt he was not producing the quality of work of which he was capable. He scored extremely subjective with A-plus creative imagination, with the rest of the artist's pattern. He has decided to continue in commercial art, but to work his own way and to sell independently to different agencies. He says he would like to create first, then sell, rather than work under hurried assignment to produce in a specified time. Other subjective commercial artists with perhaps less creative imagination may enjoy being given ideas to create; these rely more for expression on other aptitudes, such as tweezier dexterity and on perfected skill.

✓ But whether in commercial art or the fine arts, the extremely subjective and high-creative artist undoubtedly belongs in the studio, where he can express his ideas in his own way. The result is far better work and greater originality. On the other hand the objective, high-creative person with art talent works within the business organization successfully, particularly if he is business-minded and tends toward the executive end of art work. If such executives in art and design departments understood the high-creative, subjective people working for them, they would place fewer restrictions on them, allowing them to work at their own pace. Undoubtedly they would get not only a better satisfied employee, but a higher quality of work and originality.

Not long ago the art director of a large greeting card firm was tested in Los Angeles. He took the tests out of curiosity,

for he felt he was in the right work; he enjoyed it, and the firm seemed to like him. Producing cards that sell is his first concern. Administration interests him to the extent that he takes evening courses in it. He scores as the group influencer with objectivity, strong creative imagination, and inductive reasoning, plus memory for design and tweezers dexterity, but with high structural visualization. Many of the ideas used for cards are his own, but some of the staff working for him handle most of the technical details in producing the drawings. His only aptitude not used in his job is structural visualization, but it is significant that his hobbies are architecture and jewelry design, both of which demand high structural visualization.

✓ Department stores and stores dealing only in home furnishings, offer increasing opportunities for interior decorators. The human engineers have found that the most successful interior decorators have a sales-aptitude pattern with high proportion appraisal and memory for design. Window display employs the same talents as stage design—subjective personality, structural visualization, high creative imagination, and art talents. Window display has almost developed into an art in some of the larger cities.

But is there a place for the executive with a limited art talent or just an extensive knowledge of paintings or vocabulary of art, who is interested in art, who is not subjective enough to become a real artist, yet who has no desire to enter business? His solution may be in an executive position in museums, galleries, or in the theater. One man who tests as an executive and who scored high in the vocabularies of music and art, has set about to organize theater projects in smaller cities with no access to the legitimate theater. This not only satisfies him but adds much to the cultural and self-expressive life of any community.

The group influencer, with art talents and no desire for ordi-

nary business, can sell or promote in the field of fine arts. Selling fine paintings, sculpture, or rare antiques of lasting beauty and quality are a few possibilities. These require high general vocabulary, vocabulary of art, and knowledge of paintings.

The knowledge-of-paintings test is a difficult one which the human engineers usually give only to professional artists or to those interested in art. But an interesting fact about knowledge of paintings is that it frequently accompanies the observation aptitude. Teachers score low in observation in the general teacher's aptitude pattern and this is confirmed by art teachers who generally score low in the knowledge-of-paintings test. Observation itself may be a misnomer; for the person with low observation believes he has it, for he sees and hears everything. Invariably, he thinks himself most observant. However, the person with high observation sees only one thing at a time, but he sees it thoroughly. If looking at a painting, reading, or working, he may be completely oblivious of what goes on about him. Perhaps observation is a step toward measuring concentration.

✓Architecture certainly is a form of art, and, like art, may exhibit good or bad taste. Real architects who can combine the beautiful with the practical are always needed. The most successful architects score objective with high creative imagination, structural visualization, and memory for design, with average or above accounting aptitude and tweezier dexterity. They score high in general vocabulary, vocabulary of art, knowledge of paintings, and extremely high in vocabulary of architecture.

A man with this pattern was tested in Chicago and at the time was working unhappily as a toy designer, which is extremely subjective work. Architecture had always interested him, and he scored surprisingly high in vocabulary of architecture, yet never had studied it. He scored high in inductive reasoning

also, which gave him a group-influencing pattern. He and his wife decided that he should go to architectural college and then should aim for work in low-cost housing, which is group-influencing work. No more was heard from him until recently when his wife came to be tested. She reported he was now in his second year in architectural college and was very happy about it. Even at this stage some of his plans have been accepted.

But this man scored high in the knowledge tests. These tests are more important than we may realize. All of us score higher in some phase of learning than in another, and we need this knowledge in our work. Established artists invariably score high in their specialized-knowledge tests, for they are at the top in vocabulary of art and knowledge of paintings. Persons with art talents but low in knowledge usually try one thing and then another in the art field. They have difficulty in selecting their work, and when they do, they seem incapable of finding important thoughts to express even after they have developed skill in their medium. It has been the experience of the human engineers that too few people interested in becoming architects or artists possess enough knowledge in their fields to select their specialty intelligently. The feelings are there, so are the talents, but they do not know how to put them to use, so they flounder about unhappily.

Sometimes our strongest knowledge does not coincide at all with the field of work indicated by our pattern of aptitudes. What then? All knowledge should be used, for it is a valuable possession, an accumulation of years, and perhaps indicative of our real interests. Environment may give some of it, but usually we know the most about something that really interests us. For early success in following accustomed paths, our aptitudes and knowledge should coincide from the beginning, which is possible to achieve through testing children. Yet some

of the greatest original advances have been made between fields, where knowledge in one field is combined with quite different aptitudes. The human engineers believe we should try to bring divergent knowledge and aptitudes together into some activity that uses both. For example, if you have strong creative imagination and a sales-aptitude pattern, and have picked up a large vocabulary of art, even with no signs of art talent in you, undoubtedly you can make a place for yourself in advertising, which deals primarily in concepts and their visual display.

As in any other field, general vocabulary is of great importance to the artist. The worker in fine arts without a broad knowledge lacks the depth and understanding needed to convey his thoughts to others. The most successful artists whom the Laboratory has tested score high in English vocabulary. Cartoonists in general score low on the vocabulary scale. By this we do not mean to imply all cartoonists are low vocabulary. Some, without a doubt, are very high, with a sense of humor depicted in their cartoons that adds a badly needed sparkle and laugh to the world.

/ A cultivation of surface should be developed along with growing knowledge, both general and specialized. This need applies to us all, but perhaps the worst offenders are those in creative work such as writing or art. In seeking to probe deeply within ourselves, we may develop depth but may lack surface. To do our best and to get along in the world both are necessary. A person who constantly bares his emotions and deeper feelings to the world, who wears his heart on his sleeve, is regarded as an emotionally unstable person, and life is made just that much more difficult for him. No matter how great his talent, skill, and knowledge, he rarely is taken as seriously as the person who has both surface and depth. Is it not better to use surface in our daily living, to cultivate the art of being socially agreeable to the world, and to let our depth reveal

itself in our work? It is neither necessary nor desirable to perpetually display our depth to the world in our actions, talk, and dealings with all people. If we have depth, it will come out in what we actually do.

The Writer

EVER since man began to think, a few have struggled to record their thoughts. The written word has come to be one of our most valuable possessions. It may color and give direction to our lives. Through it we may gain knowledge, entertainment, emotional and spiritual satisfaction; through it we may have the greatest thinkers for companions and may be privileged to enjoy their deepest and most carefully developed thoughts.

Writing is one of the most satisfactory forms of self-expression. Unless we have pronounced art talent, we usually shun painting or sculpture; unless we are musically inclined, musical expression rarely lasts long with us. However, to many persons, writing seems different. On the surface it appears such a natural and easy form of expression that many persons cherish a belief they could write if they wanted to, that perhaps some day they will.

Many do have the talents for writing, but those who attempt it without the necessary aptitudes soon become discouraged. Yet aptitudes alone will not make a writer; there is a large amount of plain hard work involved. Knowledge is essential, too. Without vocabulary, the writer is at a loss to express his thoughts, and an exact knowledge of words is his most valuable tool. Without it, clarity and depth are impossible.

The primary aptitudes of a writer are creative imagination, inductive or analytical reasoning, or both, and low structural

visualization. Accounting aptitude is valuable to a writer, for it helps him to reduce errors in his manuscripts, but it is not essential. To do deeply creative or introspective writing, descriptive or emotional writing such as poetry, or writing which involves prolonged research, an extremely subjective personality is needed. Writers who attempt to earn a living thereby should not be too objective, because of the long hours spent alone at work. The objective person rebels at too much isolation, yet if he has the aptitudes, he should write, but preferably he should choose the type of writing that does not make heavy demands on his objectivity. He might write light fiction or humorous pieces, or do writing that depends upon securing information from others. In a writing job he makes the best reporter, advertising writer, publicity person, or radio writer.

Inductive reasoning is perhaps the most essential trait of a writer. It is this aptitude that enables him to sort out ideas and to arrange them logically. Creative imagination gives him the flow of ideas, extremely helpful to any writer. But the human engineers believe anyone strong in inductive reasoning should write, even if he has no creative imagination. Inductive reasoning is the aptitude of the professions, and anyone in a profession should write to clarify his thinking, and because written works add to success. The possessor of inductive reasoning which is stronger than creative imagination, will probably become a scientific writer, a historian, an essayist, or a critic. The high-inductive, low-creative person, in using his inductive reasoning coupled with broad experience and knowledge to develop action and the life of a character, may be able to create a more true-to-life story than a person who relies mostly on strong imagination. The high-creative and low-inductive person who wants to write may belong in writing of an incongruous nature. In fact, scores in inductive reasoning may suggest the kind of writing for which one is best fitted.

Most writers score low in structural visualization, which indicates a positive gift for handling abstract ideas. However, a person gifted with both structural visualization and a writer's aptitude pattern may be the one to write scientific textbooks that can be more readily understood by structurally minded students. The human engineers suggest such people, with scientific knowledge, might experiment with writing textbooks in their field with facts and problems arranged in the order of mathematical texts.

Earning a living by free-lance writing, whether for magazines or in writing books or plays, is usually a long, slow, and often discouraging process. Very few persons launch a writing career with a great American novel, a Broadway hit, or a best seller. The first published work of a famous author was a recipe for cabbage salad. To begin we should do it as a hobby, or secure a job where we can develop writing skill. But in order to write, we must have something to say, and what we write must have meaning to us. Most serious writers are really crusaders at heart who need a cause to keep them going in writing as a life's work. To write convincingly and with personal satisfaction, we must select some problem or phase of life—basic or surface, depending upon how we feel—which we believe important and interesting enough to write about, learning all we can about it and making it our special province, whether we attempt to reveal it through plays, poetry, stories, books, or articles.

Few writers have much to say until they reach full maturity, except perhaps poets or others who appeal to the emotions more than to reason. Writers need experience, for from it insight is gained and may then be communicated convincingly. After all, isn't this the basic reason for writing? And what is experience? When Goethe was a young man, he consulted an officer spending his furlough with him about how to get experience. The

officer replied, "Experience consists in experiencing what one does not wish to experience; which is what it amounts to for the most part, at least in this world."

When we have chosen our general subject, where do we begin? We want to express our views and have them published as soon as we can. The human engineers suggest book reviewing as an opening wedge, for it is one field that established authors seldom touch, and it is hardly possible for professional critics to read all books published. We should select books related to our specialty. Then, even if our reviews never get published, we have gained an important advantage. We have been forced to read the books thoroughly and at least have added that much more to our knowledge of the subject.

Professional critics score with extremely high vocabulary, and higher inductive reasoning than creative imagination. But those who review books sometimes find their opinions, though sincerely given, are not always shared by posterity. In the November 15, 1836, issue of Waldie's Select Circulating Library, we came across this review of Dickens' latest work: "The Pickwick Club—this trifle, the 'Posthumous Papers of the Pickwick Club,' we should be ministering to false, trifling, and depraved tastes, if we recommended [it] as containing either good wit or humour. Using, therefore, our usual unbiased mode of speaking, we pronounce it unworthy of purchase."

But one never knows where book reviewing might lead. We are thinking now of a young man tested by the Boston Laboratory some years ago while at Yale. At the time he professed a profound interest in problems of peace and war but planned to become a business executive. He scored as a writer, but with extreme objectivity, which gave him a group-influencing pattern. Because of his high vocabulary, strong creative imagination and inductive reasoning, it was suggested he write,

beginning with book reviews on the subject of peace and war, since that was his chief interest. By following this path, now fifteen years later, we find him at the center of the diplomatic world, where with his aptitudes, interests, and knowledge he undoubtedly belongs.

Without editors the path of those who write would be thornier. Editors score in this order: high vocabulary, analytical and inductive reasoning, creative imagination, objective personality, and low structural visualization. A woman editor with this pattern and a vocabulary at the ninety-second percentile, but with extreme objectivity, was tested a few years ago in New York. The path she had trod to reach editorial work had been a rough one. She had finished college at the beginning of the depression of the 1930's, and even with additional business college training, could not find a stenographic job. Since she had to support herself, she took a job as a waitress. She even had difficulty getting that, for one large restaurant refused to hire her on the grounds that she was too well educated. By persistent hunting she finally secured a job as secretary to the scientific research head of a company; but here she ran into trouble, again. He insisted she was too talented to be a secretary and put her to work on scientific research. With her extreme objectivity and low structural visualization, she was miserable, so she came to take the aptitude tests.

Learning that she had ideal aptitudes for editorial work, she went back to her research job, determined to keep her eyes open for any editorial possibilities that might arise. A publication issued by the company seemed the logical place to contribute her services. Before long she became an editor. Since then she has advanced in editorial jobs and is now on the editorial staff of a national magazine.

Today, there are many commercial opportunities for those with writing talent to earn a living at it. Magazine and news-

paper work, advertising, publicity, radio, and movies are a few possibilities. But considerable skill and knowledge are involved to reach the top in these fields. The beginner must start modestly; many have gained experience in small organizations. Some, with little experience, have gotten themselves employed through presenting well-thought-out ideas with concrete, cleverly written samples. Getting a secretarial job in such organizations may work out for some, but it is rarely the solution.

A girl with newspaper ambitions took a stenographic job in a newspaper office upon graduation from college, believing, as many do, that this is the way to start. She developed a reputation for being an incompetent stenographer and became so unhappy and disillusioned about newspaper work that she was ready to give it up. At the time she was tested, she was planning to quit her job to take up nursing.

She scored as an ideal newspaper reporter—high creative imagination, inductive reasoning, high vocabulary, finger dexterity, observation and objectivity, but with almost no accounting aptitude. It was no wonder she had been such a poor stenographer; yet nursing would have been even worse for her, for nursing requires accounting aptitude to a high degree. At the suggestion of the test administrator, she discussed her problem with her superior and asked his permission to apply for one book a month to review for the book section. Because she had ability, it was not long before she was placed on the writing staff full time.

Advertising and publicity offer fields for the high-creative, objective writer. But a warning here is that the higher you are in vocabulary, the more particular you must be in choosing the subject, cause, or work that you will publicize or advertise. You must believe in what you are doing. If not, your heart will not be in it; you will feel you are blowing a big horn only for the sake of the noise it makes. But the group-influencing

writer, who advertises, publicizes, or promotes what he feels is useful, important, and right, can do a convincing and self-satisfying piece of work. Above all, he can live with himself.

Any writing job, because it is a form of self-expression, should be on a level with vocabulary. If not, it can be sheer frustration. In general, the higher the vocabulary, the broader the field should be. An objective, extremely high-vocabulary man, who had worked for some years on the staff of a small magazine, aimed at low-vocabulary readers, became bored and restless. He scored as an editor, that is, his inductive and analytical reasoning were stronger than his creative imagination. During the war he took a job in Washington on the information staff of a large governmental agency. He was soon made magazine editor and has done a brilliant job. The scope of his work is broad enough to satisfy him.

If we have other aptitudes in addition to the writer's pattern, we are probably happiest working in the field of these aptitudes. That is, if artistically gifted, we work more compatibly and successfully in fields related to the arts; if musically gifted, we belong in music or the field of sound, such as radio or movies. The chances of meeting others with similar tastes and interests are greater, and in addition we have more opportunity to use our aptitudes.

Advertising, built up on ideas, needs the highly creative person with his flow of original ideas. But creativeness by itself runs in all directions unless curbed, and needs another aptitude to guide it. Occasionally the Laboratory tests a person who has only the aptitude of creative imagination, and so high that he cannot handle it. He may fit into advertising as an idea man. It is true some of his ideas may be fantastic, but there are always other people in such organizations with a guided or lesser creativeness and better judgment, who can sift out his ideas.

Writing is perhaps the best means of building up a reputation

as an authority in a special problem or field of work. An unusual case is that of a broad-thinking, liberal minister tested in Chicago some years ago. He was forty-five then, and had reached a crossroads in his life. He had been dismissed from the pastorate of his small community for holding what was felt were too radical views on orthodox religion as well as world affairs. He tested as the group-influencer with extremely high vocabulary. His creative imagination was at the one-hundredth percentile.

He was intensely interested in world problems, and had been drawn into ministry because of a deep desire to help mankind. Now he was troubled about where to turn. Although he had spent his life in ministry, to continue there with his convictions—even if he could—would be hypocritical. He thought of business. Should he go into advertising or publicity? Should he sell? He had a wide knowledge of world affairs; he knew there were scores of world problems that need solving for the good of humanity. But what could he do?

The human engineers believe it is virtually impossible for any man of forty or over to get a job in any business or industrial organization unless he has had extensive experience in a particular field. Even then, it is not easy. Anyone with high creative imagination rarely is happy in a standard job. As to solving world problems, large problems never are solved by shifting around; they are solved only by persistence, by doing one small thing after another, but always with the same goal in mind.

It was suggested that this man select a problem in which he had interest and knowledge, that he read all the books he could about it, and study it thoroughly. With his aptitudes and vocabulary, writing could be a solution for him. He could begin by writing short articles and book reviews on his subject, but

not too radically, for there are many persons working slowly and soundly toward the solution of wide problems who mistrust radical steps. They know progress is made slowly and with infinite care. He should join national organizations concerned with his problem and with his experience in public speaking he might give lectures on it. By actively associating himself with a problem, he could become a vital part of it.

Although he never had tried to write for publication, he did have years of experience in preparing his sermons. He selected a broad and sound problem, then set to work to build his knowledge in it. He began writing on the practical and timely aspects of it, and a number of his articles have been published. By steady, hard work and earnest effort, he is gradually becoming an authority on his problem and hopes to eventually participate in world affairs.

But he had a high vocabulary with which to work. A writer must have vocabulary. Those who have led interesting lives and who look to writing as a future source of income and self-expression are seriously hampered if they lack vocabulary. A few years ago a professional baseball player was tested. He had reached an age where he knew he could not continue in baseball much longer, and he looked to the Laboratory for help in deciding where to turn. He scored extremely subjective with high inductive reasoning and low structural visualization. With his aptitudes, experience, and reputation in baseball, and his thorough knowledge of such a popular sport, writing stories or articles about it would have been an ideal solution to his problem. But his vocabulary was at the fifth percentile. At his age, and with his aptitudes, there is little chance for advancement without vocabulary.

There is no retirement in writing unless we lose our mental faculties. Writing is one occupation that can be carried on

throughout life. Mental faculties continuously used rarely rust. It is also work in which widening experience, mental maturity, and growing knowledge can become of increasing value to the world.

Your Own Business

A LONGING dear to the heart of many of us is to have a business of our own. We would like to be independent, to have the satisfaction of building up something that is ours alone. The mortality rate of new business enterprises is high and, too often, discourages many who would like to establish their own business.

The human engineers believe that apart from personal desires, there are practical reasons why more of us, who want to do it, should go into business for ourselves. Think of the many men who interrupted their careers to go to war or to take war jobs. As horrible a thing as war is, who knows how many may have welcomed the armed services or a war job as an escape from a hated position? After four or five years at war, even if they should want to return to their former companies, most are obliged to go back at the level they left. For men in their late thirties, early forties, or older this can be a serious problem. In most industries a man must expect to be retired at sixty; in a depression the age limit may be lowered to fifty. Pensions rarely are enough on which to live a full life. And there are more than a few who do not want to end a career at sixty, to mark time the rest of their days. For older men particularly, who must make a work adjustment, the human engineers believe the wisest course is to capitalize on knowledge and experience, and with a knowledge of their aptitudes attempt to build up some work of their own.

The Laboratory tests many young men who express a hope of someday going into business for themselves. For those who really want to do so, the time to begin planning is now, and not in a nebulous future. Usually it takes from five to ten years to establish a going business. There is almost certain to be a period of meager earnings, and it is much easier to struggle for a foothold in our twenties or thirties than in our forties or fifties. But in order to start a business, we need knowledge and experience in our field. That is, to open a restaurant we should have worked in one to understand its operation and problems; to open a laundry we need experience in one, and so on. Without a background, the soundest plan is to take a job in whatever type of business we hope to establish, and to lay our plans on the side for establishing our own. If we already have general knowledge and experience, well and good, but specific skill and knowledge are essential.

In their research into the aptitudes, skill, and knowledge of all types of people, the human engineers have uncovered certain facts useful to those who want to start their own business, or who may have started it but find things not going so well as they had hoped. In general the business we start should be in the field of our aptitudes, with our work in it guided by our aptitude pattern. Furthermore, it should be on our vocabulary level and should utilize all our acquired knowledge and experience.

While any aptitude pattern can be used in starting our own business, there is one aptitude that seems to characterize those who establish and operate their own businesses successfully. This is intellectual vision, called also "visual imagination." It is your ability to visualize a distant goal and stick to it. The person who scores low in it sets no definite goal. In general, executives working for salaries score low.

From the research into this aptitude, it was found that all

people with graduate college degrees score high. Two and one-half times as many college graduates score high in it than those who have no degrees. Those who graduate only from high school, by choice, score low. But the human engineers believe, whether or not we have intellectual vision, if we want to start our own business, we should do it. The only point is that if we have the aptitude, we are more likely to stay with our business through thick and thin and to make it survive.

An important fact is that if the nature of our work involves a staff of employees, either we need the executive pattern ourselves or we should employ someone to handle administrative details. The extremely subjective person operates his own business successfully if it is the type where people come to him, rather than his going to them. Even so, if he employs a number of people, he needs in most instances to have an executive with him. In a business where the foundation rests on the owner's invention of his product, if he plans to produce and sell it, he needs both an executive and salesmen, for probably he would be extremely subjective.

Much, of course, depends upon the type of business. Some businesses rest solely on good administration, and in this event the founder should have the executive pattern. One man tested in New York operates a successful, but small-sized, trucking business. He scores as the executive but with low vocabulary. His job is pure administration. There is little doubt that with a higher vocabulary he would recognize opportunities to expand and to better his business.

Often in starting our business we do it on a partnership basis. But a word of warning here: even if we go into business with out best friend, it does not insure a harmonious and well-working relationship. It may be the end of a beautiful friendship. Unless the aptitudes of each complement the other, the results can be disastrous. Yet it is a common tendency in form-

ing a partnership to feel we are doubling our strength if the other person is the same type. But if both do the same thing, too often it becomes the well-known case of "too many cooks."

Many small businesses are based primarily on administration and selling. If we have the executive pattern ourselves, we do not want another executive as a partner, for both try to do the same thing, and no two of us work alike. It means only conflict. Nor if one is the salesman, should we have another salesman as partner. Two high-creative people working on the same thing, with equal authority, can be almost cataclysmic. Did you ever see two real salesmen at work on one person? Instinctively they compete; each tries to outtalk the other, to outsell the other. The ideal partnership in a business involving both administration and selling is for one to be an executive and the other a salesman. The executive enjoys handling details that bore the salesman. Neither of them likes doing the work of the other, and they do not get in each other's way. The executive's low creativeness puts necessary curbs on the salesman's high creativeness, while the salesman feeds ideas to the executive and pushes him along. But they must be on a level in vocabulary or they won't understand each other, and their objectives may be totally different.

If we examine the most successful businesses founded on a partnership, we usually find the partners complement each other in aptitudes. An interesting case came up in Chicago during the war. Two young men, partners in a thriving business, who came to be tested had an unusual request. They had both been drafted, and naturally did not want their business to deteriorate while they went to war. They had worked together so compatibly and successfully that their object in taking the tests was to learn their own aptitudes so they could select two women in their company with aptitudes identical to theirs to run the business for them.

One tested as the executive, the other as the salesman. Both were fairly high vocabulary. They had their twenty women employees tested to find the two who would resemble them closest in both aptitudes and vocabulary. The interesting factor is that the two who tested the most like themselves were the very ones they had considered for the work, but had hesitated before testing because these women had the least formal education of any on the staff. Yet instinctively they had recognized kindred qualities in the two women, who, incidentally, did a highly successful job of operating the business throughout the war.

Suppose two extremely subjective engineers go into business together, producing and selling the same mechanical product. One may handle administration, and the other selling. They may soon find themselves wrangling over technical details of their product, with nerves frazzled from doing work for which by nature they are not fitted. Or should they see alike on their product, they may become so engrossed with engineering details that administration and selling are neglected.

Two extremely subjective people may work compatibly in a service organization. For example, if two mechanics open a shop, both should be subjective to be the best mechanics. Each has his own work to do. They do not have to solicit business; if they are good mechanics, people come to them. But if one is objective and the other subjective, the objective partner may visit with customers while the subjective one does all the work. If one is high vocabulary and the other low, the gulf between them only widens as they work together, for they won't have the same objectives. Two people working together to establish a business must have the same goal, or it becomes a house divided.

While we need to work in the field of our aptitudes and knowledge, it may happen that our knowledge does not co-

incide with our aptitude pattern. It is possible to bring the two together. A man who has done this is a charming, alert man in his middle forties, a Harvard graduate who has worked at assorted jobs both in this country and abroad. For some years prior to the war he had been on Wall Street, but with the war he came to Washington to hold an administrative position with a temporary government agency concerned with business problems. In this capacity he came close to the problems of small business, which interested him intensely. When the war ended, he decided to use his experience and knowledge to build up a business of his own.

When he was tested, he proved objective with very high creative imagination, with inductive and analytical reasoning, accounting aptitude, and intellectual vision. He scored about ninetieth percentile in general vocabulary, and scored A in the vocabulary of business. His general aptitude pattern was that of an editor or writer, with his interest and knowledge in the problems of small business. How could he bring them together? A business of his own, in which he issues a weekly newsletter to small business, informing them of government matters pertinent to their businesses provides the answer. The work utilizes high vocabulary, his many strong aptitudes, and not least is that it satisfies his high creative imagination which always had tormented him in a standard job.

The person who sets out to be the "lone wolf" in his business, completely on his own, may turn to consultant work. But to be an effective consultant, he needs not only originality in his endeavor, but he should be an expert in his field. With a reputation, and tangible examples to show what he can do, it does not matter whether he is objective or subjective. However, it is usually the extremely subjective person who has perfected his skill in a specialty who is qualified to give counsel to others.

An objective man who was tested has built up an unusual

consultant service. He is now a potato-raising expert. When he was released from the service, he was thirty-eight. He owned a potato farm in Maine but felt that farming was too isolated and restrictive a job for him. This was confirmed by his aptitude pattern, for he scored objective with a group-influencing pattern. He wanted to continue the operation of his farm, but to be more than a farmer. Since his work kept him busy only a part of the year, he decided to go to agricultural college to learn all he could about potato blights and improved agricultural techniques. With this knowledge coupled with practical experience, he has made himself a part-time consultant to a syndicate which operates many potato farms. He spends much time visiting other farmers, gathering information, and applying his practical knowledge to their problems in his work for the syndicate. While he operates his farm, he does little of the actual farming himself.

For those who yearn for a little farm there is an important factor to consider, which may not be realized by those living in a crowded metropolitan center, where country life seems a rosy dream. This is that not only knowledge of the specific kind of farming is needed but also the real farmer must be extremely subjective. The objective person can be a farmer if he approaches it from the executive angle. Furthermore, if he is high vocabulary, unless he lives in a farming community where there are others who speak his language he can lead a lonesome life. And no matter how subjective one is—unless a hermit—companionship with others of similar outlook is a necessary stimulant.

Another important fact for the person who goes into business for himself is to realize that no one person can do every kind of job well. Human beings are perverse creatures; a natural tendency among all of us is to work on our weaknesses rather than our strengths. Because we do a thing well, we accept it as

natural and think little of it, but we wear ourselves out trying to better what we know we do not do well. For instance, a really good salesman by reason of his extreme objectivity and high creative imagination is not a good executive. Yet suppose a perfect salesman goes into a business for himself that demands both executive and sales ability. The administrative details weigh him down, and he would far rather be out selling. But because he recognizes his weakness, he may concentrate too much effort into perfecting his executive ability. His problem would be simplified if he turned this over to a real executive and exercised his salesmanship. And his business undoubtedly would prosper.

Or take the case of an extremely subjective engineer who has developed a product which forms the foundation of his business. Too often he accents the negative by concentrating on selling and administration, which he does poorly, while he neglects the further technical development of his product or of new ones, upon which his business really depends.

It is perfectly true that life presents many struggles which must be surmounted. But it would seem there is enough difficulty in trying to reach a higher level in one's aptitude pattern without adding the burden of making ourselves what we are not.

Most of us are stubborn about this. We feel because we do not do something well, we should drive ourselves to it. We want to show ourselves and others that we can do it. But in so doing we exhaust ourselves, we lose all feeling of self-expression, we develop strong feelings of inferiority, and we sacrifice the fulfillment of abilities. In the long run we fall behind the person who knows his own row to hoe and who works diligently at it.

This is apparent in taking the aptitude tests. The aptitudes we have are so natural to us that we do not have to work hard in the tests to make a high score. Consequently, we may think ourselves very low in a trait in which we are high. On the other

hand, those tests in which we score low exact so much work from us that we think we did an unusual job and must be high, and we are surprised to find the opposite. Many of us think ourselves less talented than we are, while most of us think we have more knowledge than we actually do.

Because the work for which we have inborn ability comes so naturally to us, we do not realize it is our true work in which, if we work hard to gain knowledge and skill, we can find real self-expression. We are inclined to ignore praise for that type of a good job and would like to be recognized for something so difficult for us that we feel inferior to it. Remember Cardinal Richelieu never wanted flattery on his qualities of statesmanship; what he really wanted was someone to praise his poetry. It is as Shelley says, "We look before and after, and pine for what is not." Yet those persons who follow the path that is right for them invariably are the ones who gain satisfaction from life and who accomplish the most.

The great advantage of scientific measurement of aptitudes, as imperfect as it may be, is that it indicates our strengths and our weaknesses, so we can work to develop our strong points rather than struggle in work we do poorly, and which someone else with the proper aptitudes can do far better. If we can remember this in starting our own business, we stand a far greater chance of success than if we try to be all things ourselves. And if we begin to think in terms of aptitudes, many problems become clear, both our own and those of the people working for us. The chances of real accomplishment are far greater than if we work against nature trying to be what we are not and expecting others working for us to go against their natural abilities.

Changing Our Work

WE may think that by trying out enough kinds of work, eventually we would land in some work that suits us perfectly, and in which we would never be bored, restless, or discouraged. Such a pursuit may be condoned when we first try out our wings, for it all adds up to experience, but if we follow the work will-o'-the-wisp for too long, we end up dissatisfied and befuddled. People who lead a life of shifting from one kind of work to another usually find themselves at middle life with such a checkered career that no desirable position is open to them. They know a little about many things, but not enough in any one field to carry out responsibility. Nor are they able to set a goal, or to see the possibilities of any one kind of work. And we must have a goal or a broad problem that we are working to solve. Without it life has no direction or meaning; we become restless flounderers. With the multitude of problems facing our world today, no one should have difficulty in establishing a useful goal.

Our work is our life; rightfully it should be the unfolding of our real selves. How wasteful it is to spend our lives in work we dislike, in which we never feel we are being our real selves or achieving what we want. If we are not sure of our work, a scientific measurement of aptitudes may prove to be a boon. Through a knowledge of our natural abilities, we can set a goal centered about our strongest aptitudes and interests, and begin to work in a direction basically right for us. But most of us set

our sights too low; we plod along with our eyes to the ground. It is the great man who can keep his feet on the ground and his head in the clouds. But it is aiming high and setting a difficult and remote goal for ourselves that keeps us busy and interested all our lives, that offers us a challenge.

If we need to make changes in our work—and many of us need to make some adjustment—the human engineers caution us that changes should not be abrupt. In the law of the universe, violent changes are accompanied by severe upheaval; the same holds true in work. However, we should not remain too long in the same job. As our knowledge and experience increase, we should change jobs but not our life's work. We must outgrow our jobs; we go against nature if we try to remain stationary.

Very few of us are in the wrong work completely. Our trouble usually is that we lack knowledge and that we are using too few of our aptitudes. It is possible to use a job in which we have some knowledge and experience, and by gradually adding aptitudes to it, to ease our way into the work we want. We undoubtedly will end up in work far different from the present and quite removed from what we ever anticipated. And one of the greatest advantages in knowing our aptitudes is that even if we are forced temporarily to be in a wrong job, we understand why we feel as we do and make allowances for it. We know the job may be at fault rather than ourselves.

Many people who take the aptitude tests, and who find they are employed in work contrary to their aptitude pattern, feel they should make the transition abruptly, that aptitudes alone are enough to insure immediate success. But skill and knowledge are of equal importance, and these take time and effort to acquire. Thus in making a transition we should utilize in so far as possible every bit of laboriously acquired knowledge and experience, and should try to develop one additional aptitude at a time.

To illustrate how the Laboratory would suggest making a complete transition, we will take the case of an engineer in his late twenties, tested in Tulsa. He was vaguely dissatisfied with engineering, and through the aptitude tests found he was not an engineer. Because of his executive pattern coupled with strong musical talent and knowledge, ideally he should have been an executive in some phase of music. Within himself this seemed right, and he began to plan his course of action.

The human engineers proposed that he might go about it like this. He should first determine what he really wants in life. Is it to be of service, to gain money, to have power, to have prestige, or what? Then he should set some broad goal he feels of great importance. Let us say he wants to be of service and he wants prestige, and his goal is to give people a broader cultural musical education through radio. He should begin at once to increase both his general and musical knowledge. Then he should aim to get out of straight technical engineering into an engineering executive position, where he would have the opportunity to prove his executive ability. From there he might move to an engineering executive position in radio, utilizing as background both his engineering and executive knowledge and experience. Then, with musical knowledge and aptitudes to back him up, he could well move into a purely executive position in radio, where he would be in a position to put through procedures relative to his broad general goal. It would take hard work, an increasing knowledge, and an eye kept firmly on his goal. But by gradually adding his executive and musical aptitude to his original work, it would be possible to make such a transition.

In making work changes, knowledge is of utmost importance. In this connection, and with long research to confirm it, Johnson O'Connor says, "After thirty no man should change his work because of his aptitude pattern unless his knowledge, ex-

pressed in percentiles, is as great as his aptitudes, by means of which he gained his present place."

Hobbies sometimes help those who want to change their work, for they often are indicative of true talents and interests. A radio announcer who liked radio but disliked his job in it, spent his spare time tinkering with radios. When tested in Los Angeles, he scored extremely subjective, with high structural visualization, and tonal memory. He has gradually changed into the technical end of radio toward which his hobby pointed and where he belongs.

From a practical standpoint there can be a danger in hobbies. This is that we may devote so much time to them that our means of livelihood is neglected. Ideally, our work should embrace those aptitudes that we use in our hobbies, although where it is not possible to include an aptitude in otherwise satisfying work, a hobby is the logical expression of it. The important thing is that we *use* all our aptitudes.

One man whose hobby and business did not mix was a dress merchandiser. His hobby was composing and conducting, which he loved. In fact, he spent so much time with it that only half his mind was on his business and he went into bankruptcy. When he was tested, he scored as a salesman, with unusually high musical talent and knowledge. He saw at once the fallacy of trying to serve two masters. Fortunately, he had established a modest reputation in music and was able to secure a position planning musical programs for a large radio network. He is happy and successful in his work, which offers expression for both his sales ability and his musical talent.

But again, he had knowledge. This specialized knowledge is of first importance in changing our work. Another man tested several years ago had been an unsuccessful musical composer and conductor. Although he wanted to do this more than anything else, he found he could not earn a living at it and he

shifted to photography. He scored as a composer or conductor, but his general vocabulary was low, and his musical vocabulary was only about the thirtieth percentile. He is convinced that if he raises his general English vocabulary, he can become an outstanding composer, but he does not think he needs to increase his musical vocabulary. He believes he knows enough about music now, yet his musical vocabulary score shows clearly that he does not. In order to shift again from photography back to composing, and to earn his living at it, he must have both vocabularies.

Although few persons can make radical and abrupt work changes successfully, there are some who have done it, but in general the human engineers do not recommend it. An interesting and delightful man, who left the bond business to become a newspaper man at the age of fifty, is an unusual case. He had worked on a newspaper for a brief period after graduating from college, but after he had married and had children to support, he found selling bonds more lucrative than newspaper work. He became a successful investment banker, but his heart never was in it. He was restless and unhappy, and had always longed to be in some way connected with newspaper work and the people in it.

He took the tests because his children did but was not surprised to find he scored as a newspaper man. He had an extremely high vocabulary and also scored high in tapping, indicative of physical energy. In truth, he does not look his age and possesses that contagious enthusiasm we find among the extremely objective. Weighing all matters carefully, and convinced he could not spend the rest of his life in finance, he decided to make a clean break, to start over again, and to become either a newspaper or public relations man.

Perhaps if he had been extremely subjective, he never could

have done it, for the criticism of others might have been too much for his sensitivity. Yet high-vocabulary persons, who within themselves know they are right, can ignore criticism. You can imagine the critical remarks that rained down on him, but tossing them off for what he felt they were worth, he gave up his work and secured a minor job on a financial newspaper. This seemed to him the logical place to start, for he had knowledge there.

For years he had thought himself quite subjective due to misplacement in his work. He had spent much of his life being conventional and staid. Now his long-pent-up extreme objectivity is at last getting full release. By working hard at writing, by getting around and making a multitude of friends, he has moved up until he is well on his way toward becoming the public relations head of a firm. He tells us he feels like a new man. But it has not been easy, and he has worked hard. Too, there were several important factors in his favor. He had financial means and could afford to take such a gamble, and his children were grown and were not dependent upon him. Above all, he had high vocabulary with which to work.

Sometimes a seemingly insignificant change can make a startling difference. A salesman in a New York stock brokerage firm never had sold much. He was dissatisfied and discontented with his work and with himself, and when tested was contemplating a complete change in his work. He was certain he was subjective. However, he scored as the perfect stock salesman—extremely objective with 100 per cent accounting aptitude, high creative imagination and number memory, and low inductive reasoning. This was puzzling to the human engineers until he explained his method of selling. He did it all by telephone, and rarely saw a customer in person. With his extreme objectivity he needed direct association with people to give

vent to his real nature. He now calls on his customers in person. His sales have more than tripled, but—more important—he enjoys his work thoroughly.

Sometimes circumstances beyond our control enter in, and we are forced to make radical work changes. The physically disabled person sometimes finds he must completely reorient his life, work, habits, and even ways of thinking. His is a difficult problem. But by law of compensation, life levels off all things. The person who faces his difficulties, who uses each difficulty as a challenge to do better, can achieve great accomplishment. Many have scaled the heights with physical disability. Milton was blind when he wrote *Paradise Lost*; Beethoven became deaf and could not hear his later compositions; Cervantes had only one hand; Epictetus was lame. Undoubtedly you can think of others who rose above physical weakness to rely on their mental resources, and whose names live in history. These, of course, were geniuses. However, most of us possess five, six, or even more high aptitudes, and often some knowledge in a particular field, so it is possible to find another direction in which to turn successfully. There are so many possibilities for the use of aptitudes that almost any aptitude pattern can be adjusted to fit one's physical needs.

Several years ago an ex-marine wounded in South Pacific fighting was tested in St. Louis. He was despondent about his future, for he had lost his right hand. To him this meant his livelihood, for he was a photoengraver. All his training had centered there, and with this taken from him, he did not know where to turn. When tested, he was low in spirits and unduly sensitive; all the fight had gone out of him, and he was considering a job such as watchman or work of a similar nature. He had only a high school education and felt this kind of job was all that could possibly be open to him with such a disability. Yet the thought of giving his life to such work appalled him.

He scored as an ideal engineer, with extremely subjective personality and high structural visualization. This explained why he had been a good photoengraver and why he had liked his work, but it also showed the way for his future.

He was asked, since he had the aptitudes for it, why not go to college under the G.I. Bill of Rights and become an engineer? He was hesitant, for he did not see how he could become an engineer without his right hand. But when it was pointed out to him that a creative engineer uses his brain and not his hands, he became enthusiastic. He is now in his third year of engineering school, doing exceptionally well. Here was a young man, ready to give up, who is now entering into work far more expressive of his aptitudes than photoengraving, and work which is opening up a new way of life to him.

Another man, following the wrong profession for his aptitudes, has been forced into compatible work by a physical disability. He was a Navy commander in the war, forty years old, and one of the first to come back from Guadalcanal. He had been a surgeon, but had developed such a severe nervous twitch that it was obvious it would be a long time before he could practice surgery again. He was bitter about it. He explained to the test administrator that he had made money at surgery. However, he never once intimated that he had enjoyed it.

He did not test as a surgeon, who is extremely subjective with strong structural visualization and tweezers dexterity. On the contrary, he scored low structure, objective, with strong creative imagination, inductive and analytical reasoning, and high vocabulary—the ideal editorial pattern. When he learned this about himself, he looked both a little sheepish and relieved. He explained then that his father owned a chain of newspapers and that he came from a long line of editors. He had gone into surgery because his brother did; both had felt they should deviate from the family pattern and should go on their own. Yet in

his heart he always had wanted to be a journalist, but he had pushed aside thoughts of it and had concentrated on surgery. Since he had grown up with the newspaper business, he had intimate knowledge of it. In fact, he said his father recently had offered him one of the family newspapers, but he had felt his father was being only charitable. Now he was sure he would take it.

Then there was a deaf woman in her early thirties who had been a stenographer. She recently had become totally deaf, but through the years of attempting to circumvent her deafness in taking dictation, she had become expert in lip reading. She did not really like stenography and wanted to be in work that she felt more humanely useful. She scored as a teacher and is now teaching lip reading to men deafened in the war, using her own disability as part of her work.

A thirty-year-old Army captain had an agricultural college background, and had planned a career of scientifically working his own farm. Now, due to war wounds, outdoor work is a physical impossibility. He scored extremely subjective with high creative imagination, inductive reasoning and low structural visualization—the aptitude pattern of a writer. He has hired a manager to run his farm and he is working to make himself an authority and writer on agricultural problems that he feels of broad importance.

Often the physically disabled person learns to rely on his mental resources so much better than the rest of us. Such people, who utilize time in convalescence in study and in building up knowledge and vocabulary, come out of it better people. To each of us our own problems seem unique. To some there appears to be no answer. Yet any problem, if we work on it, can be solved.

A great many people already in the right work think they are misplaced. When this happens, it can generally be attributed

to lack of knowledge. It is not difficult for a person who lacks knowledge to deceive himself and to believe some work totally different would be right for him, for he cannot see his own possibilities in a job or fully understand the work. The human engineers tell us our vocabulary must be above our aptitudes. If it is below, aptitudes predominate, and we need to adjust this.

But once we know the work we want and the goal we are seeking, we must get a job. If there is one type of applicant an employer quickly crosses off his list, it is the person who vaguely offers to "do anything." We must have something definite to offer; we must convince the employer that we can be useful to him in a specific way. Otherwise, what point would there be in hiring us? Yet it is amazing in reading the ads for jobs wanted how many people specify they will "do anything."

The world will not change to suit us. We have to fit ourselves into it. And this means work. It is only through hard, continuous effort in the field of our aptitudes that we may gain contentment and peace of mind. Everyone must struggle. Those people who get the most from life give the most to it. They always have new ventures brewing, their life is never "secure," staid, and settled, and they always are seeking new angles in the pursuit of their goal. What if we do at times make mistakes? No one can expect to be right all the time, and mistakes may teach us valuable lessons.

To those afraid to try the new for fear of a mistake, who are bent only on gaining financial security in life, this may be a revolutionary thought, but security in that sense is not security at all. It is insecurity. Isn't the only real security that we can get in life dependence on our inner resources? Anything else can be taken from us. We expand and buttress our inner resources through knowledge, through hard work in what is right, natural, and self-expressive for us.

Every change made in our work should be an advance, a

change that will bring us nearer our goal, even if it involves financial sacrifice. And when we change jobs due to promotion, we should be sure that the new work either uses the same aptitudes that made us successful enough to be promoted, or preferably will offer opportunity to use more aptitudes and will be a step forward toward what we are trying to achieve.

Vocabulary and Success

WE get some concept of the importance of words if we try to visualize the world without language. Suppose that today languages ceased to exist. All that man has built up for himself would be for nought; we could not communicate with each other. All our engineering, scientific, educational, and philosophic achievements would be useless. Trains, ships, and, in fact, all transportation would stop. Food would rot, people would starve. We would be reduced to an animal existence. Our civilization has evolved with the development of man's mind and the use of language as a means of expression and understanding. Physical struggle for existence has been replaced to a great extent by intellectual struggle, and thus a knowledge of words has become a most valuable working tool. It is through vocabulary, which indicates our scope of knowledge, that we can grasp the thoughts of others, that we can think for ourselves. And the wider our vocabulary scope, the more efficient are these tools of thought. Through long scientific research and measurement, the human engineers have conclusive evidence that *vocabulary contributes more to success in life than any other single trait yet known.*

Low vocabulary holds back so many persons from real accomplishment that its importance cannot be stressed too strongly. It is so much simpler to acquire vocabulary in early life through formal schooling that it is in later years when we must make constant effort at it. If more young people would

realize this, they could save themselves much future grief and disappointment. But when we are young, it is so easy to slide by on high aptitudes that many ignore vocabulary building. The reckoning comes in later life when at middle age the world is no longer interested in our possibilities, as manifested in high aptitudes, but expects us to know something. We are judged then by our knowledge. As mentioned in a previous chapter, in studies made of thousands of persons, it is the low-vocabulary ones of middle age who are in routine, uninteresting jobs.

Some energetic persons forge ahead in business or industry just so far, then never go any higher. They reach a plateau limited by their vocabulary. A large industrial organization, long interested in vocabulary and aptitudes, listed those employees carried on the payroll primarily because of length of service, but who had not fulfilled the promise shown when hired. When the Laboratory tested them, all scored high in aptitudes but low in vocabulary.

An outstanding instance of the difference vocabulary can make is shown by two hardware salesmen whom the Chicago Laboratory tested on the same day. They scored exactly alike in aptitudes—high creative imagination, low inductive reasoning, extremely objective with low accounting aptitude. But one had a high vocabulary while the other was low. The low-vocabulary man was a salesman in a retail hardware store; the high-vocabulary man was traveling around the world handling the distribution of metal products for his firm.

Some of us may believe vocabulary to be the result, rather than the precursor of success. We may feel if only we can attain a highly important place in life, we will acquire vocabulary due to position, but this is not so. The human engineers have found that vocabulary precedes, rather than follows success, that it may be a cause of it. And in general, high-

vocabulary people earn more money than those with a low vocabulary.

Of course not all high-vocabulary people are successful. They could be, for they have a major tool with which to work. But vocabulary, or knowledge, must be linked with aptitudes, and with hard and sustained work to achieve skill. Vocabulary is not inherited. However, there is a possibility of an undiscovered aptitude that may give some persons more than others a natural curiosity and interest in words, for the sake of the words themselves, but vocabulary itself is a matter of acquisition. When Goethe said, "I had inherited from my father a certain didactic readiness of speech," undoubtedly it was not inheritance but environment. The children of high-vocabulary parents will not inherit it, but because of their environment, they may acquire it. It is believed that parents who enlarge their own understanding of English words help their children in vocabulary building.

In any field of work studied, those at the top have scored correspondingly high in vocabulary. From the Laboratory's research, however, it is not professional scholars who score the highest on the general vocabulary scale. It is major executives. Vocabulary, as measured by the Laboratory, is indicative of a broad, general knowledge, and top executives appear to possess this to a stronger degree than all other groups.

A case which points up sharply how vocabulary does correlate with executive success occurred in a large industrial plant. A group of college seniors were measured for aptitudes and vocabulary, and while still in school were selected by the company to go to work upon graduation. They were seeking men with an executive pattern as material for future executives. At work the men were shifted around so each had equal opportunity to learn and to assume responsibility. Within five

years those men who in college tested in the top 10 per cent in vocabulary became executives. Not a single man who had tested in the bottom 25 per cent in vocabulary became an executive in the same period of time. Large vocabularies not only characterize executives, but predict success. And if we are objective, most of us do aim for executive work of some kind. Since ultimate executive success correlates more closely with English vocabulary than with any other trait, it behooves those with this aim to look to their vocabularies.

Vocabulary is of first importance to the executive, for his work depends in a large degree upon knowledge rather than aptitudes. The difficulty encountered by many is that when we are mature enough to become executives, and by the time we realize, too, the importance of vocabulary, often we are too old to consider further formal schooling, and without it vocabulary building is a painstaking and laborious effort. Most of us need the discipline of formal schooling to adhere to vocabulary building. Vocabulary accumulates at a normal rate during the school years, and then unless we work on it, in the next twenty-five years it increases little more than what we would gain in two years of school. After schooling ceases, it is a matter of conscious effort to build vocabulary and to broaden our scope of knowledge.

It is high vocabulary that enables us to think on a broad scale. High vocabulary may be the result of much reading, of broad experience that puts us in touch with new words. But we must not merely guess at word meanings, but must make ourselves their exact masters. Many of us think we have a higher vocabulary than we actually possess. Too many of us know the approximate meaning of a word and it is only when we must give a synonym that we realize how far amiss we may be. Fine distinctions in word meanings and their usage mark the educated man. When he reads or hears words spoken, he incorporates

them into his knowledge. Without exact knowledge of words, we can have no real knowledge, but only a sketchy conception of what is read or spoken.

While high vocabulary enables us to think on a broad scale, it does not necessarily mean that all high-vocabulary people are humanitarian minded. The question goes deeper than that. It depends in great measure upon what we want from life. All of us have different goals. No matter what our motive, whether it is to be of service, to make money, to gain power, to have leisure, or what, it is high vocabulary that enables us to get what we are after, to gain what we consider to be success.

The low-vocabulary person not only is not capable of thinking on a broad scale, but is inclined to limit his own possibilities. Often he feels inferior in his work. Because he senses he is not advancing as he should, he may seek escape in pastimes of various kinds. The man or woman who neglects work to indulge to excess in golf or bridge, who overdoes the social end of life, often is low vocabulary. The high-vocabulary person sees life as a whole in clearer perspective, and social life assumes a more normal role.

One of the curses of low vocabulary is that if we cannot express ourselves in words, we may do it with our fists. This is particularly true of the subjective, naturally sensitive person; the objective type does not take matters so to heart. A young man who was tested in Boston had been in numerous fist fights and had stolen a car. The probation officer, after no end of trouble with him, brought him to be tested to see if the aptitude tests could throw any light on his behavior. He was surly, impossible to handle. He scored extremely subjective with high creative imagination and a rare 100 per cent inductive reasoning, with almost no vocabulary. His high ideaphoria gave him an abundance of ideas, and his unusual inductive reasoning gave him equipment to think perfectly, but since he had no

words with which to do it, he expressed himself by stealing and by fisticuffs.

A common characteristic of low-vocabulary persons is to place the blame for failure on others, to feel there is unjust discrimination against them. Typical is a man in his fifties tested recently in Los Angeles. He is a factory worker, in a routine job involving only hand dexterity. He has worked in the factory for almost thirty years and during that time has advanced little. In fact, he recently had been demoted. He scores high in a number of aptitudes, including both hand dexterities, but is in the bottom 10 per cent in vocabulary. He blames the supervisors in the factory for his lack of success. "They don't like me," he explained to the test administrator. "I'm too smart for them. They know I see through them."

While vocabulary is important to all of us for success in life, the too-many-aptitude person has an acute problem. Unless he builds vocabulary, he is doomed for failure, to become little more than a "jack of all trades." But if he has high vocabulary and makes an effort to use his aptitudes, he has opportunity to become an outstanding person. With high aptitudes the too-gifted person gets through high school without making an effort to gain much knowledge. Often the too-many-aptitude person flunks out of college. Choosing a career is difficult, for he can select any direction, but no standard job uses all aptitudes. His real solution is to build up unusual work on a broad scale, but this he cannot do without high vocabulary.

A twenty-three-year-old ex-Army corporal tested recently scored A in all the measurable aptitudes, but very low in vocabulary. He has the opportunity to go to college, but feels himself smart enough as he is. His life has no direction; he cannot see his own unusual possibilities. He shifts from job to job and is working now as a theater usher. Since he cannot see the necessity of vocabulary he probably will continue to go

from one minor job to another. Here is a drifter who could be so much.

The extremely subjective person who develops some specialty as a life's work, such as engineering, needs general vocabulary. Although high in knowledge of his specialty, too often he is woefully lacking in general knowledge, which he needs to get along in the world, to understand human relationships, and to make the most of his specialized knowledge. He is too inclined to live in a narrow little world made up of technical problems, for his studies have centered around his specialty, and he neglects the broad general knowledge needed to make a place for himself in the world.

In marriage, vocabulary may be of more importance than we realize. Husband and wife on near vocabulary levels are more likely to understand each other, to speak the same language. Is there anything more dividing than an ambitious, high-vocabulary man trying to climb up in the world, and being held back by a low-vocabulary wife, who works desperately to bring him down to her level? The wife who complains that her husband never tells her anything, never discusses his business with her, may be on a vocabulary level so different from his that he has learned through experience that he cannot talk to her. Even in that most difficult of marital relationships, where one member is extremely objective and the other extremely subjective, compatibility may be enhanced if both are high vocabulary, for at least intellectually they understand each other's ways. Although vocabulary is but one factor in a successful marriage, it is too seldom given consideration.

Because vocabulary is not an aptitude, it can be acquired. There is hope for any of us, for vocabulary accumulates from effort and experience. While as yet it is not an established fact that a laborious acquisition of new words leads us directly to success, the fact remains that few successful persons score low

in vocabulary. Statistically, those who remain low have little chance for success.

In the *Johnson O'Connor English Vocabulary Builder*, aimed to give us scientific help in building vocabulary, eleven hundred words have been arranged in their order of difficulty. It is interesting to note in this study of eleven hundred words that the one hundred easiest words average six letters, a hundred of medium difficulty average seven letters, while the hardest average eight letters. Familiar English words come to us in general from the Anglo-Saxon, the less known from Latin, while the most difficult frequently from Greek origin.

The *Vocabulary Builder* is based on three laws of learning, extremely helpful to those who wish to build a permanent vocabulary. The first law is that every word thus far statistically studied belongs somewhere on a scale extending from the well-known to the almost unknown. The second is that the English vocabulary of each of us stops more or less abruptly on the familiarity scale. Up to our borderline, we know almost all the English words that exist, but beyond this point comparatively few. The average adult taking a vocabulary test arranged in the order of difficulty marks correctly all beginning words, but at the end of the test he is correct in only about one out of five, which statistically means he does not know the words but is only guessing. The margin of his vocabulary lies at the point where statistics indicate he is guessing. The exception is the foreign-born person who apparently learns first those English words derived from the same source as his own, so that his curve of knowledge is less standard.

The third law is that our rate of learning is greatest for words just on or just beyond the borderline of our vocabulary. For the easy words we already know, our learning rate is zero, and for the words far beyond our borderline, the rate is also zero.

Our fastest learning rate is for those words that lie in the border between the known and the unknown. Too many of us think that if we learn some spectacularly difficult words, we add greatly to our vocabularies. But unless we are up to that level, the chances are we will forget them quickly for want of use.

In using the *Vocabulary Builder* we are advised to run through the pages, skipping them until we come to a page where we know only a few of the words. This is our borderline, and from there on we encounter words of increasing difficulty.

Good reading is a valuable aid in building vocabulary. But when we read, we should have an adequate dictionary at hand. Then when we encounter an unfamiliar word, we can look it up, delve into its derivation, and try to make it our own. The next time we see it, we may have to look it up again but we will recognize it as a former acquaintance. Some persons with little formal schooling have attained a high vocabulary level through serious reading and a steadfast search for knowledge.

A forty-year-old woman recently tested in Tulsa had gone only through the eighth grade, yet scored 83 per cent in vocabulary. She is an avid reader, interested primarily in philosophy, semantics, and logic. An interesting fact about her is that for the past five years, with no Certified Public Accountant standing, she has successfully headed a group of sixty accountants.

Some adults find it simpler to enlarge vocabulary by building it in one subject at a time, using each as a stepping stone to a broad general vocabulary. It is always helpful in learning a new word to examine carefully how we heard or saw it used. But no matter how we do it, the point is we should do it. The possible rewards are not only greater worldly success, but greater insight and confidence in ourselves and in what we can do.

The world is changing constantly. New knowledge creates new fields of work in which those prepared with broad qualifications may realize their potentialities and may play an important part.

Aptitudes and Alcoholism

ALCOHOLISM has its roots in a deep-seated maladjustment of some nature. When this is related to one's work, there is a strong possibility that aptitude testing can help the alcoholic to adjust himself. The alcoholic drinks to relieve some unbearably strong inner tension. What causes the tension is an individual problem. It may be a tangled domestic life; it may be an inability to face life. But if it is in relation to his work and what he wants to do with his life, self-knowledge through scientific measurement of aptitudes may help him.

In their research the human engineers have uncovered some of the causes of tension that may or may not lead to alcoholism. The Laboratory has tested alcoholics, who, through adjusting their work, have stopped drinking, but it also has tested others who have remained alcoholics. Thus we can only speculate as to the positive relationship between aptitudes and alcoholism.

Our unused aptitudes cause restlessness and tension. All of us are born with talents, which if unused torment us for want of expression. There is no escaping them. Their lack of use causes us to feel that we are not being our real selves or exercising our full powers. The result is an inner conflict, a dissatisfaction with ourselves, and strong feelings of inferiority. The real alcoholic may be highly gifted rather than deficient in talents. He is rarely a dull person and often is the one with the greatest possibilities. Two of the most brilliantly gifted men

whom the Laboratory has tested are alcoholics, and one holds the record of the highest score in vocabulary.

If we have strong talents—many of us test with four, five, or more high aptitudes—and are not using them, we may turn to drink as a release from pressure. This may be the reason why we find so much excessive drinking among manual laborers. With strong aptitudes and no chance for their expression, the result may well be alcoholism.

Entirely wrong work may lead to alcoholism. Excessive tension may arise from trying to develop aptitudes that we do not have and from ignoring those we possess. A confirmed alcoholic tested in Chicago was a bond salesman. He needed extreme objectivity and high accounting aptitude to sell bonds, but he scored exactly the opposite. He was extremely subjective with low accounting aptitude, with high creative imagination, and he scored 100 per cent in the musical aptitudes. He never had used his music. Since he has taken up musical study, aiming to become a performer, he has stopped drinking. He is seriously and rapidly working to perfect his music and is finding great satisfaction in it.

The right work for our personality may be an important factor in alcoholism. With as much drinking as is done in business today, it frequently happens that an extremely subjective person trying to fit into the sales pattern drinks too much in a desperate attempt to be "one of the boys." The work is contrary to his basic nature, the inner tension becomes strong, and he drinks more and more to relieve pressure and to make himself feel at ease. In fact, the misplaced and extremely subjective person may be the most frequent alcoholic. He is introspective, sensitive, conscientious, and by nature retiring. Trying to behave extremely objective causes severe inner conflict. He thinks something is wrong with himself and seeks solace in drinking. Extremely subjective people are happiest in

individual work—in the arts, the theater, in music, in the professions, or in research where they uncover new knowledge.

Not long ago a socially prominent family had their son, a college student, tested. The mother, a social leader, came to visit the Laboratory in a huff. Her son had tested extremely subjective. For some time, she said, she had complained that he spent far too many evenings and Sundays at the university telescope, but now that the human engineers had encouraged it, he was there more than ever. She felt he was ruining his social possibilities, that he had far too much charm to waste on an inanimate telescope. What she had apparently forgotten was that her husband, equally subjective, in following the social whirl had become an alcoholic at forty. It was not until he was fifty and had entered into research work for himself that he stopped drinking. He has since made valuable contributions to his specialty.

The high-vocabulary person working with low-vocabulary people may become an alcoholic. The human engineers have found that such a person, no matter how objective he is, invariably thinks himself subjective. He feels he is at fault and works desperately to conform, to find a common ground with his fellow workers. The others instinctively recognize his difference, which only aggravates his feelings of uniqueness and subjectivity. He wants people to like him, to feel he is one of them. Since he cannot do it naturally, he may try it through too much drinking. This is not uncommon in business.

When a high-vocabulary person not only works with low-vocabulary people but has no chance to use his strong aptitudes, his predicament is even worse. One of the most heartening cases in the Laboratory's files is that of an ex-soldier tested in Chicago. He had been dishonorably discharged from the Army for writing scathing letters to the War Department. Discouraged with life, he had tried suicide; that failing, he took

to drinking. At the time he was tested, he was working as a bellhop in a fashionable Chicago hotel, making about \$20 a day, and spending virtually every cent of it on liquor. He was drunk every night.

He came from a small country town and had only a high school education. It was a surprise to him to learn he had a high vocabulary. He never had associated with high-vocabulary persons. He scored objective with high creative imagination, inductive and analytical reasoning, accounting aptitude, number memory, and observation. He never realized that he had the talent to write, that he probably would be a capable newspaper reporter. Yet instinctively, while overseas, he had exercised his writing powers in letters of criticism to the Army. His dissatisfaction came from complete misplacement in his work. When these feeble attempts to be himself, though wrongly directed, had resulted in a dishonorable discharge, he began to drink.

He wrote the Laboratory recently that he had a new lease on life. He stopped drinking and began to save money. He appealed his dishonorable discharge and has gone to college to become a journalist, determined to make something out of his life.

While a directed and usefully employed creative imagination offers a chance for a deeply satisfying life through the release of creative forces, high creative imagination left at loose ends results only in overpowering restlessness and nervous tension. It could well underlie alcoholism. Creative imagination must be guided by another aptitude and must be directed toward some goal. The subjective person must use it in some individual creative effort or in research; the objective must use it in some group-influencing work. Left to itself, it can play hob with its possessor.

There is increasing alcoholism among women, particularly among those at home with little to do. Could it be the most

frequent alcoholics among such women are those with strong creative imagination and other unused aptitudes? The woman with high creative imagination is bored by routine, and routine housework, whether or not she does it herself, becomes wearing unless there is creative work to offset it. If she has such work, she can keep her mind on creative projects while she goes through the daily routine. But if she has only housework, and not much of that, the nervous strain with undirected imagination can become unbearable. There is a constant vague and deep inner pressure that needs release in creative work. If she does not have it, she may become neurotic; she may imagine herself with sundry ailments no doctor can cure. If the pressure becomes too great to face, she may become an alcoholic.

The extremely objective woman who leads a secluded life at home, particularly if she is high creative with no outlet for it, may turn to drinking. Invariably such women think themselves subjective, yet cannot pin themselves down to subjective creative pursuits. They need people; they are group influencers, and must have some activity that allows for its expression. Any of us, man or woman, needs to keep busy, preferably in work for which we have the aptitudes, which is important to us, and which makes us feel useful.

The person with no goal, who drifts restlessly along through life, may become so overwhelmed with feelings of futility and inferiority that liquor may seem the easiest way out. A knowledge of aptitudes helps here, for if we know the right direction, we can set a destination. Too many people in their hearts want one thing from life, yet work for another. They take no positive steps toward accomplishing what they really want, and the inner conflict becomes so unbearable that alcoholism may result. Sometimes we set false goals for ourselves, perhaps from a sense of duty or because it seems the thing to do, without thinking things through and endeavoring to be as true to our-

selves as possible. Scott's "Oh what a tangled web we weave, When first we practise to deceive!" is as true when we deceive ourselves as it is when we try to deceive others.

Many men, and women too, are in business who do not belong there. Men whose real ambition in life is to be of human service, who want to feel in their own small way that they are helping make the world a better place, but who are working only to make money, often get in trouble. They rarely fit into high-pressure organizations. Because they sense an unfitness, with vague restless feelings that they are not fulfilling early hopes of doing something of value in the world, they may turn to drinking in an effort to shove aside these thoughts.

Too many of us are brought up to believe that making money is of first importance, and we try to conform although it goes contrary to our real natures, basic ideals, and aims in life. We never feel right or natural within ourselves, even if we are using our aptitudes. There is something beyond the scope of aptitudes that is a vital part of us. It is the answer to the question: what do we want from life? In what direction do we wish to use our aptitudes? In an organization bent only on making a profit, people to whom money is secondary may find themselves miserable and unhappy. This may be particularly true of executives and salesmen who are directly concerned with making money for the firm, while specialists, such as engineers, usually have specialty problems quite removed from the profit end. It could be that the deep-thinking, idealistic man whose chief goal in life is to contribute to human welfare but who is devoted solely to making money may become an alcoholic. It is true the executive must be an executive, and the salesman must sell, but their hearts must be in the use of their talents.

The too-many-aptitude person may become an alcoholic. He has such strong aptitudes that no standard job is satisfying. With potentialities in so many directions, it is difficult for him

to set a goal, and no matter what ordinary job he takes, his unused aptitudes create restlessness and tension. His solution is work of a broad nature, with enough ramifications to include his many aptitudes, and for this he needs extremely high vocabulary. The low-vocabulary, objective, too-many-aptitude person becomes the tinkerer or "jack-of-all-trades," and it may be the extremely subjective, low-vocabulary and too-many-aptitude person who becomes the alcoholic who goes "on the bum."

But the too-many-aptitude person with high vocabulary who tries to work in a standard job is in particular danger of alcoholism. His unused aptitudes plague him; he has enough knowledge to understand he is capable of much greater accomplishment and of early success in life. Yet because of unused aptitudes in a standard job, he never can concentrate fully on the aptitudes he is using and rarely advances as he should. He may also change his work periodically, which slows down success in any one field.

A man who knows much about aptitudes and their applications told us the tragic story of a friend of his who died of alcoholism at the age of forty-two. He was the finest and most brilliant man the narrator had ever known, and undoubtedly was objective, had all aptitudes, and had an exceptionally high vocabulary.

He had graduated with honors from engineering college at the age of nineteen. He went to work as a designing engineer for a large New York firm and was soon considered one of their most promising young men. He was full of fun, loved people, and soon, like other restless young men sometimes do, he started to drink on Saturday nights. But as his work progressed, he became bored with it. He began drinking heavily. It reached the point after some years where it interfered seriously with his work, and he was released from his job.

Although this was a blow to him, he decided he no longer wanted to be an engineer but wished to be in the financial world. He felt if he could make a fortune, he would not feel so restless and inferior. He stopped drinking steadily and enrolled in a graduate business school where he was again outstanding. His written reports were held up as examples for the class. He then moved to Chicago where he took a job selling bonds and writing financial reports. Again he showed great promise. But after a time he became restless and bored and he started drinking even more heavily than before. Often he would be away from the office for several days at a time, and once when drunk, he married a low-vocabulary, nagging woman who led him a stormy life and who bedeviled him constantly to make more money.

Although excellent in his work while sober, his appearances at the office were so unpredictable that he was again released from his job. Because he had always excelled in drawing and photography, he decided to go into business for himself as a commercial artist and photographer. Determined to start over again, he quit drinking, separated from his wife, and soon established a going business. But as soon as his affairs were going well, the pattern repeated itself. He felt he was not as successful as he should be, and feeling lonesome, he began drinking. He loved people but had few friends because of his alcoholism and because his wife had alienated his old friends. He found companionship with the "bar flies," and soon he was drinking again to the point where he frequently required hospitalization. Yet because of his ability, he kept a prosperous business going in spite of almost constant drunkenness. His last fling at drinking, which lasted a month, resulted in his death. Probably few will ever understand what he went through—the inner conflict that drove him to drinking, the recriminations and inferiority that he sensed while sober, the grim knowledge that he was wasting

his life and inflicting untold sorrow on his family and close friends.

Who can say what he should have done with his life? Apparently he could have been successful in any standard job, but for him this was not enough. With his objectivity, high vocabulary, and engineering and business training, he probably should have pooled them with most of his high aptitudes in broad engineering work on a world-wide scale, perhaps world regional planning. Or he might have become an architect and gone into the broadest aspects of low-cost housing. Instead he tried to go from one standard job to another, always totally different, with no goal and no feeling of accomplishment in any one field. His friend believes if he had used most of his aptitudes in one field of work and had aimed high, he might have become one of the outstanding men of our time.

The creative worker who becomes an alcoholic may have failed to acquire a balance of surface and depth. He may be all depth, and the unbalance may cause a tension resulting in alcoholism. Because he lacks the surface to get along well with others, he feels himself neglected and unique, that no one understands him. Thomas Paine was an alcoholic who obviously was all depth. His display of depth brought him prominence at the time the country was embroiled in the American Revolution, when depth and emotion were needed to carry on the fight. But when this was over, he felt himself friendless; he said liquor was his friend. Yet if he had cultivated surface with his great depth, undoubtedly he could have had many friends and might never have created such a stormy, unhappy life for himself.

Cross dominance may be a factor in alcoholism. That it does result in disorders, such as stammering and excessive nervousness, is an established fact. The person who is left-eyed and right-handed or right-eyed and left-handed is under constant

strain, and because of this often is confused within himself. An alcoholic tested in St. Louis is an executive, and tested as one, yet he feels he might have been an outstanding lawyer. He not only has cross dominance but he has a brilliant family to whom he feels inferior. The combination may have led to alcoholism.

No one can cure an alcoholic but himself. He must want to overcome it and to face his own difficulties. No amount of nagging, shaming, or holding "post mortems" on drunken behavior ever do a bit of good. But the outsider can help through faith and encouragement, by understanding that the alcoholic may have unrealized possibilities. Often they are basically the best people, who need only a chance and a start in the work right for them.

Philosophy of the Laboratory

WHILE we have learned to understand and utilize our material assets to a degree, when it comes to understanding and utilizing our human assets, are we even well started? The world abounds with wasted human ability and with personal unhappiness; we live in a midnight of ignorance about ourselves. We still have fear and "man's inhumanity to man." Because knowledge of ourselves has not gone forward equally with material progress, we trample and destroy that which we fear rather than attempt to understand it. And because understanding human beings has not advanced at the same rate as understanding material composition we know little about the human factor in work. Life should be an unfolding of ourselves, for each of us has some creative force we must develop in order to give our lives meaning, fullness, and usefulness. But in developing our material resources at a rapid pace, we have often made robots out of men; we have dissected jobs on a cost basis into simple, unskilled operations so that the majority of people have opportunity to use far too few, if any, of their inherent abilities in their work.

As we have pointed out in preceding chapters, the human engineers have found that it is unused aptitudes in the individual that underlie restlessness, discontent, inferiority, and feelings of superficiality and inadequacy. Since our world is made of individuals, might not our collective unused aptitudes underlie the present restless state of the world? Might not millions seek-

ing to release the pressure of unused aptitudes, to gain false feelings of superiority, find an outlet in wars, crime, tortures, cruel racial discriminations, riots, labor troubles, and in many other of the human problems that plague the world today? And are not fear and ignorance behind many of our man-made troubles? The low-vocabulary individual often expresses himself with his fists; with knowledge, we lose many of our fears. Might it not be possible through raising the vocabulary level of nations to reach a common understanding so disputes could be settled by reason rather than by war?

The late Justice Holmes once made a remark to the effect that the business of life is to function. Everything in nature has its particular role in the universe, its reason for being here. It must strive to perform its function for complete fulfillment. As a part of nature we, too, must have our function, our particular reason for being here. But in too many of us the sweep of material progress has thwarted our instinctive attempts to be ourselves; economic pressure and other outside influences distract us from performing our real function, and we do not know where we stand or what we should be doing. We set false goals; we wear our hearts in our purses; we look to others and outside influences to make us happy; we resort to all manner of escape devices; we have trouble living with ourselves and with others.

Because material progress has often obscured our natural functions, many of us have little idea of our inborn abilities and of where to use them. You will remember that almost everyone tests with four, five, or more of the now measurable aptitudes, yet it is the rare person who uses them all in his work or his play, and the great majority use only one or two. To help better human understanding, by arriving at a means of measuring our natural abilities and of determining how they can be used, is the sole purpose of the Human Engineering Laboratory.

Human engineering is not only a new science, but a new way of thinking about ourselves and others, our work and play, and what we want to do with our lives. The human engineers are convinced that the more of our inborn abilities we can develop, the greater is our chance of more fully performing our function in the world, and of gaining a feeling of naturalness and rightness within ourselves.

Just as physics and chemistry opened the way to material progress, human engineering could well play a similar role in human progress. By employing the experimental method of the sciences to the study of humans, the Laboratory hopes to arrive at a sound approach to human understanding, based on fact, reason, and calculation, rather than on emotion and imagination.

It is difficult to realize that it was only a few hundred years ago when chemistry began to evolve after centuries of superstitious beliefs. When the first true elements were isolated, they were so called because at the time they could not be broken down further. In using the scientific approach, the human engineers consider an aptitude a true one if through prolonged research it cannot be broken down, if it refuses to correlate with any other aptitude. The seventeen now measurable aptitudes are believed to be true "human elements," although further research may disclose some can be broken down. How many aptitudes there are, no one knows, but neither is chemistry by any means a finished science, yet we have only to look around us to see the rewards reaped from its present knowledge. The Laboratory's research has progressed at such a pace that within several years it is expected that many more aptitudes will be isolated.

In measuring the aptitudes of thousands of people, the human engineers have found through research and follow-up studies that certain specific combinations of aptitudes characterize the

most successful in their fields of work. Just as in nature chemical elements combine to form higher structures, might not we, too, have human elements that combine to help us attain even greater heights?

The human engineers do not believe that they have the only answer to human understanding. There are other groups working in other directions just as earnestly and seriously toward the same goal. As Johnson O'Connor says, we might think of all these groups working toward greater human understanding as lost in a dense, dark forest. To get out of the forest, to reach the destination of better human understanding, each must choose a course it believes right and stay with it rigidly. If it goes around in circles, it is lost. But if each adheres faithfully to its course, all will eventually arrive at the same place. The human engineers have chosen the path pursued by the scientific method which led to material progress, in the belief that this method of experimental inquiry can lead to human progress. They know their path is right for them, for they have seen a glimmer of light in the dark forest and believe they have started on the way out of the woods. But there is still a long way to go. And their path is not easy; it is filled with obstacles. If we humans could be treated as chemicals, if we could be heated on Bunsen burners, distilled in Erlenmeyer flasks, and exposed to gases, heat, and cold to determine our mental reactions and compositions, the process would be greatly simplified. But human beings are complex: we have emotional and spiritual needs; we have minds with which to think. The research of the human engineers depends on testing people, all kinds of people, from every walk of life.

However, the Laboratory is not a vocational guidance or counseling service. All the Laboratory can do is to give the individual it tests an inventory of his aptitudes, as it appears with present knowledge, to interpret what an aptitude or com-

bination of aptitudes might mean, and to suggest possible fields of work for their use. That is all the research chemist does with an element he discovers. His job is to *find* the element, to turn over new knowledge for others to use. The human engineers cannot understand all jobs in all fields of work; they cannot hope to understand jobs in industry as well as industry itself does. The Laboratory's work is the scientific measurement of aptitudes, the uncovering of human traits and their meaning, which should be considered as general knowledge to be utilized by those experienced in various fields of work.

Until human engineering becomes further established and recognized, such a prospect may be far away, and temporarily the individual must do it for himself. Basically, he must always work out his own salvation, for he alone knows what he wants to do with his life. But aptitudes can be a tool to unfold his inborn nature; the more natural abilities he uses, the greater are his chances of finding self-expression and contentment. The best results are, of course, obtained with children, who can be tested as early as the age of nine, for then their lives may be molded around the development of their strongest aptitudes.

Aptitude testing is not a panacea, a cure-all, or an easy way out. Too many people come to be tested in the vain hope that the Laboratory will fit them into a comfortable, easy slot in which they will live happily ever after. They expect miracles and are disappointed. Knowing our aptitudes and working toward their fullest development is only the beginning of a life of continuous effort, for the acquiring of skill and knowledge are of equal importance.

Like any new science, human engineering has old superstitions to combat in its progress—the chemists had the philosopher's stone; medical science still has its quacks, superstitions, and nostrums that deter progress. Because of a popular trend in making parlor games of aptitude tests, many overlook

the real value and serious worth of scientific measurement of aptitudes. You cannot test yourself any more than you can rely upon superstitious beliefs, nostrums, and self-medication to cure you when you are ill. The Laboratory never publishes self-tests, nor does it give out tests for unqualified people to use. A slide rule will not make you an engineer; a scalpel in your hand will not make you a surgeon.

Research is long, slow, and expensive. No matter how much time, effort, and money have gone into developing a test, if it is found that it does not add to human understanding, it is discarded. The standards are kept high, but in research as difficult as understanding human beings, standards necessarily must be kept as high as human frailty allows. Funds for research are dependent largely upon testing fees, and half the income goes back into research, while the other half carries on the operation of the Laboratories. It is purely nonprofit. The methods of research have been perfected to such an extent that if more funds were available, rapid strides could be made in isolating aptitudes. The human engineers hope eventually that measurement of aptitudes will be as important to our lives as education now is, that it will be a part of every person's knowledge. The fact that the Laboratory has grown and expanded healthily and steadily, that in its twenty-five years' existence approximately three hundred thousand persons have sought help, indicates the soundness, worth, and need for the work.

The research is also beginning to confirm the theories of heredity. Probably all real aptitudes are inherited. Some, such as structural visualization, are strongly suspected to be inherited. This aptitude, you will remember, is believed to pass from father to daughter and from mother to son. As time goes on and the human engineers have opportunity to test children and grandchildren of parents tested, more stability will be attached

to its theories of inheritance. However, generations will have to be tested before firm deductions can be made.

The scientific measurement of aptitudes is, of course, not the entire answer to a happy life. But it is a factor, of greater consequence toward the attainment of happiness than we may realize. Just as the chemists who first isolated material elements could not possibly foresee all the facets of their development and use, so is research into human elements now standing at the threshold of its possibilities. The waste of talent in the world today is appalling. We would never think of squandering our material assets as we do our human assets. We have such rich and undreamed-of resources in our human assets—their development could mean increased personal attainment bringing more happiness and good into the world.

*Suggestions for
Various Combinations
of Aptitudes*

HIGH STRUCTURAL VISUALIZATION		HIGH CREATIVELY IMAGINATIVE	LOW CREATIVELY IMAGINATIVE	HIGH ACCOUNTING APTITUDE	LOW ACCOUNTING APTITUDE
HIGH CREATIVELY IMAGINATIVE	OBJECTIVITY				Architecture, Community Housing, Consulting Engineering
LOW CREATIVELY IMAGINATIVE	HIGH INDUCTIVE REASONING	Astronomy (Mathematical), Astrophysics			
HIGH CREATIVELY IMAGINATIVE	LOW INDUCTIVE REASONING		Contracting, Cost Accounting, Estimating, Quantity Surveys		
LOW CREATIVELY IMAGINATIVE	HIGH INDUCTIVE REASONING			Safety Engineering	
HIGH CREATIVELY IMAGINATIVE	LOW INDUCTIVE REASONING	Airplane Design, Architectural Sculpture, Automobile Design, Designing Engineering, Heating and Ventilating Engineering, Inventing, Musical Instrument Design			
LOW CREATIVELY IMAGINATIVE	HIGH INDUCTIVE REASONING			Archaeology, Crystallography, Geology	
HIGH CREATIVELY IMAGINATIVE	LOW INDUCTIVE REASONING				Agriculture, Apparatus Construction, Biology, Building Construction, Carpentry, Construction Engineering, Diemaking, Plumbing, Toolmaking

		LOW STRUCTURAL VISUALIZATION			
HIGH ACCOUNTING APTITUDE	LOW CREATIVE IMAGINATION	OBJECTIVE PERSONALITY	HIGH INDUCTIVE REASONING	LOW ANALYTICAL REASONING	HIGH INDUCTIVE REASONING
		Adding Machine Operation, Banking (Teller), Stenography, Typing	Actuarial Work, Business Research, Corporation Law, Economics, Population Studies	Banking Executive Work, Executive Secretarial Work, Insurance	Bookkeeping, Clerical Work
EXTREMELY SUBJECTIVE PERSONALITY					Art Teaching, College Teaching, Ministry, Newspaper Reporting
HIGH FINGER DEXTERITY					Typography
					Art Criticism, Debating, Essay Writing

Fig. 1

		EXTREMELY SUBJECTIVE PERSONALITY	
HIGH STRUCTURAL VISUALIZATION	HIGH INDUCTIVE REASONING	HIGH CREATIVE IMAGINATION	Medical Research Scientific Research
LOW STRUCTURAL VISUALIZATION	LOW INDUCTIVE REASONING	LOW CREATIVE IMAGINATION	Diagnostic Medicine Patent Law Physiological Chemistry Paleobotany
LOW STRUCTURAL VISUALIZATION	LOW INDUCTIVE REASONING	LOW CREATIVE IMAGINATION	Book Reviewing Criminal Law Historical Writing Report Writing Rewrite Work
HIGH STRUCTURAL VISUALIZATION	LOW INDUCTIVE REASONING	HIGH FINGER DEXTERITY	Hospital Laboratory Work
LOW STRUCTURAL VISUALIZATION	LOW INDUCTIVE REASONING	HIGH CREATIVE IMAGINATION	Technical Engineering Amplifier Design Broadcasting Apparatus Design
		HIGH CREATIVE IMAGINATION	Acting Imaginative Writing

Fig. 2

HIGH INDUCTIVE REASONING	AVERAGE OR HIGH STRUCTURAL VISUALIZATION	[EXTREMELY SUBJECTIVE	Diagnostic Medicine Patent Law Scientific Research
	AVERAGE OR ABOVE ACCOUNTING APTITUDE	[Corporation Law	Book Reviewing Criminal Law Historical Writing Law—General Report Writing Rewrite Work
LOW STRUCTURAL VISUALIZATION	EXTREMELY SUBJECTIVE	Complaint Work— Department Store Diplomacy International Relations Politics	
	NOT EXTREMELY SUBJECTIVE	HIGH MEMORY FOR DESIGN	[Art Criticism
HIGH ANALYTICAL REASONING	HIGH ANALYTICAL REASONING	Debating Editorial Work Essay Writing	

Fig. 3

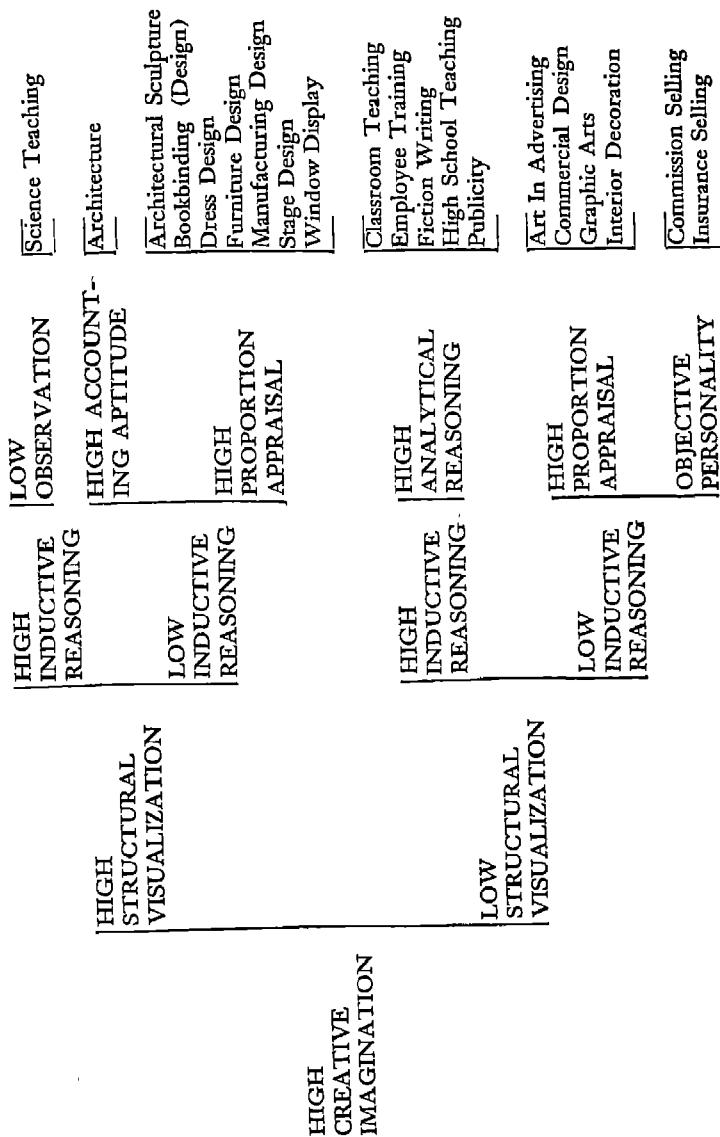
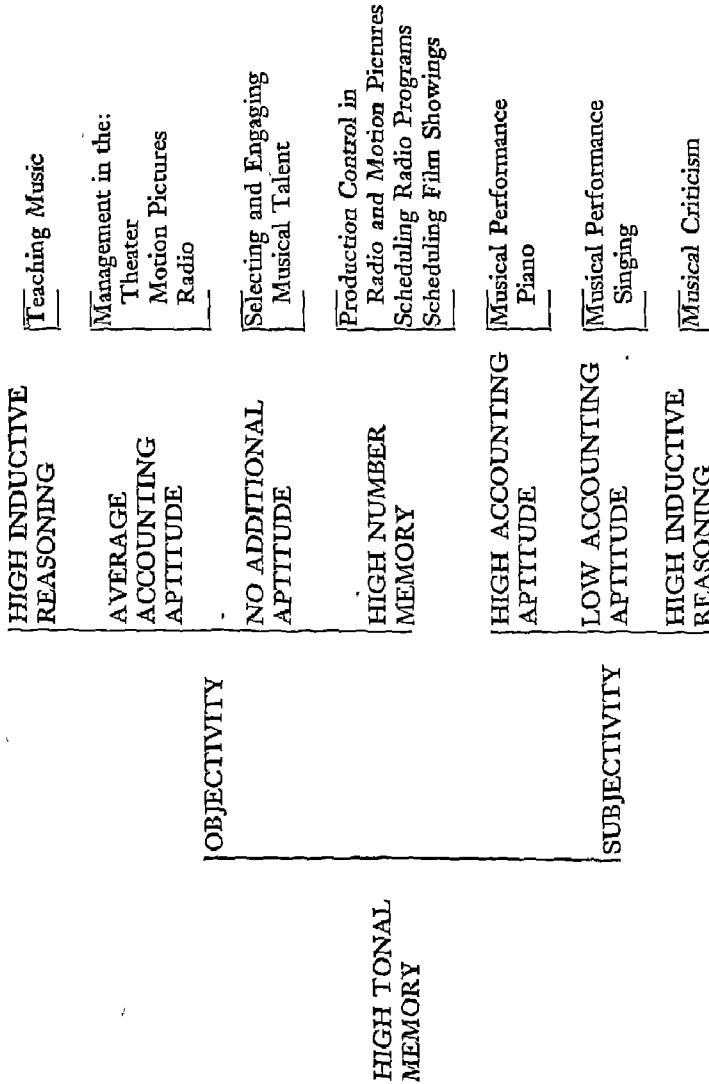


Fig. 4

HIGH ANALYTICAL REASONING	Accounting
HIGH NUMBER MEMORY	Library Work
HIGH FINGER DEXTERITY	Adding Machine Operation Banking (Teller)
LOW STRUCTURAL VISUALIZATION	Business Research Economics Evaluating Advertising Campaigns Forecasting Election Returns Insurance Adjusting
NOT EXTREMELY SUBJECTIVE	Executive Work
NO OTHER ESTABLISHED APTITUDE	Actuarial Work Banking (General) Statistics
HIGH TWEEZER DEXTERITY	Nursing
AVERAGE OR HIGH STRUCTURAL VISUALIZATION	Cost Accounting (Manufacturing) Estimating Making Quantity Surveys
HIGH ACCOUNTING APTITUDE	

Fig. 6



HIGH STRUCTURAL VISUALIZATION	HIGH DEXTERITY	BACTERIOLOGY HISTOLOGY METALLOGRAPHY MICROSCOPE RESEARCH
	HIGH ACCOUNTING APTITUDE	ASTRONOMY
HIGH OBSERVATION	NOT EXTREMELY SUBJECTIVE	SAFETY ENGINEERING
	HIGH INDUCTIVE REASONING	DESCRIPTIVE WRITING NEWSPAPER REPORTING
LOW STRUCTURAL VISUALIZATION	NOT EXTREMELY SUBJECTIVE	INSPECTION SUPERVISION

Fig. 8

HIGH NUMBER MEMORY	SUBJECTIVITY	AVERAGE ACCOUNTING APTITUDE	NO ADDITIONAL APTITUDE	NO ADDITIONAL APTITUDE	NO ADDITIONAL APTITUDE
		AVERAGE ACCOUNTING APTITUDE	NO ADDITIONAL APTITUDE	NO ADDITIONAL APTITUDE	NO ADDITIONAL APTITUDE
HIGH INDUCTIVE REASONING	OBJECTIVITY	HIGH CREATIVE IMAGINATION	AVERAGE ACCOUNTING APTITUDE	Store Selling	Editorial Work
		LOW CREATIVE IMAGINATION	AVERAGE ACCOUNTING APTITUDE	Production Following, Chasing, Expediting	Stockroom Keeping

Fig. 9

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